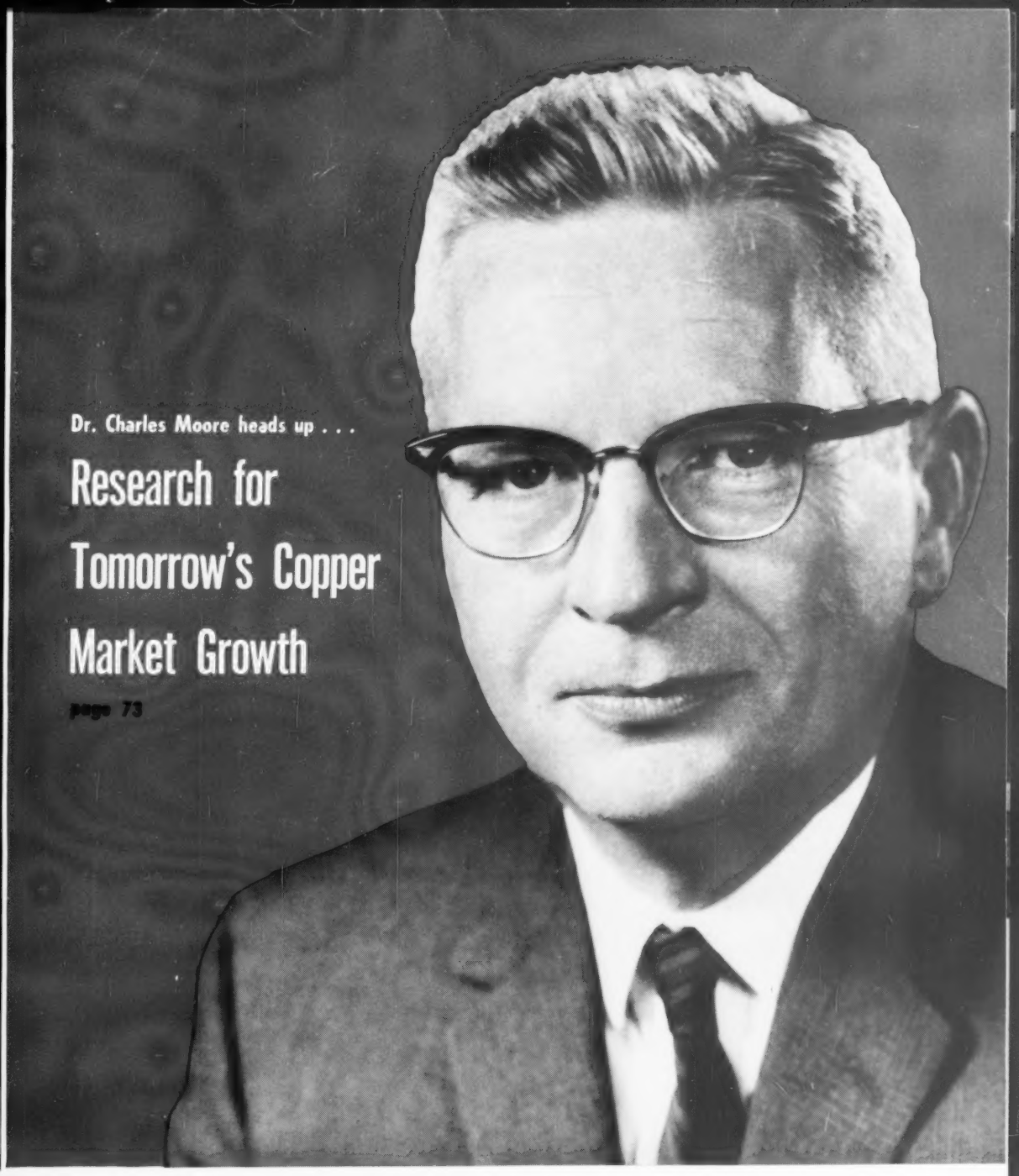
STEEL The Metalworking Weekly
A PENTON PUBLICATION
OCTOBER 9, 1961



Dr. Charles Moore heads up . . .

Research for Tomorrow's Copper Market Growth

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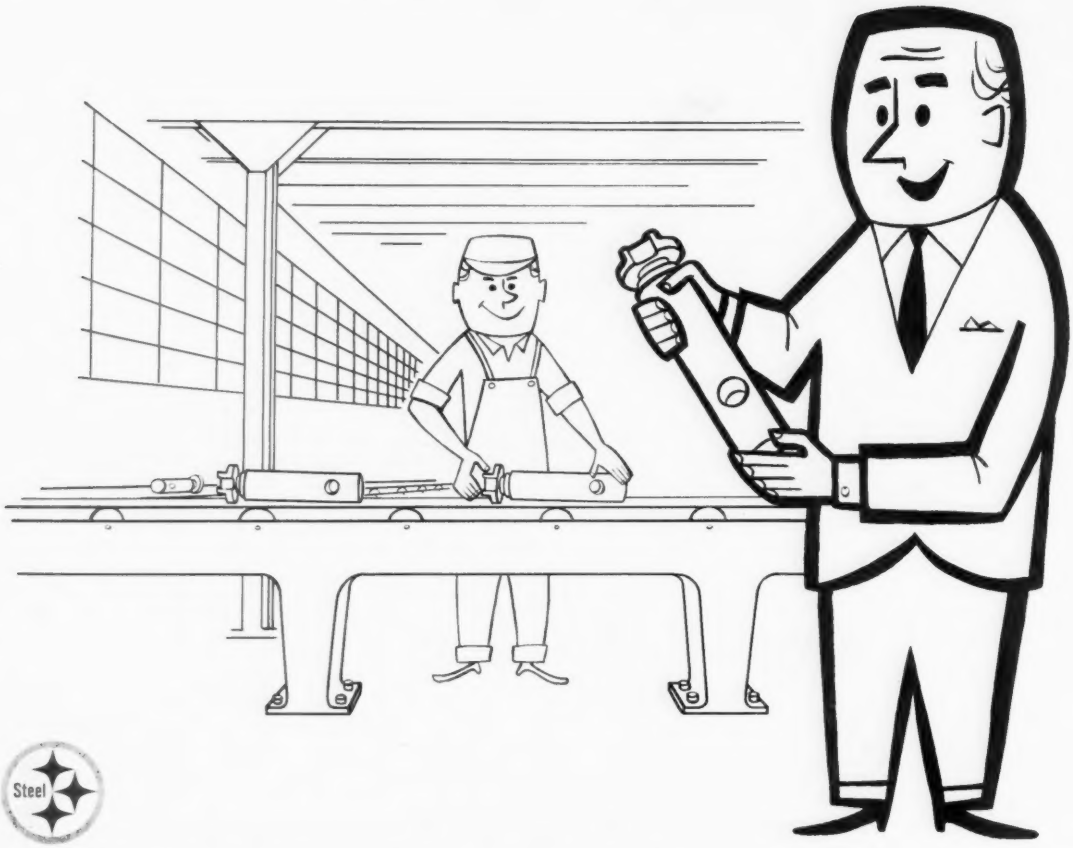

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Make good fabricating sense? To find out more, contact your local B&W District Sales Office or Steel Service Center. Meanwhile, write for Bulletin TB-430. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

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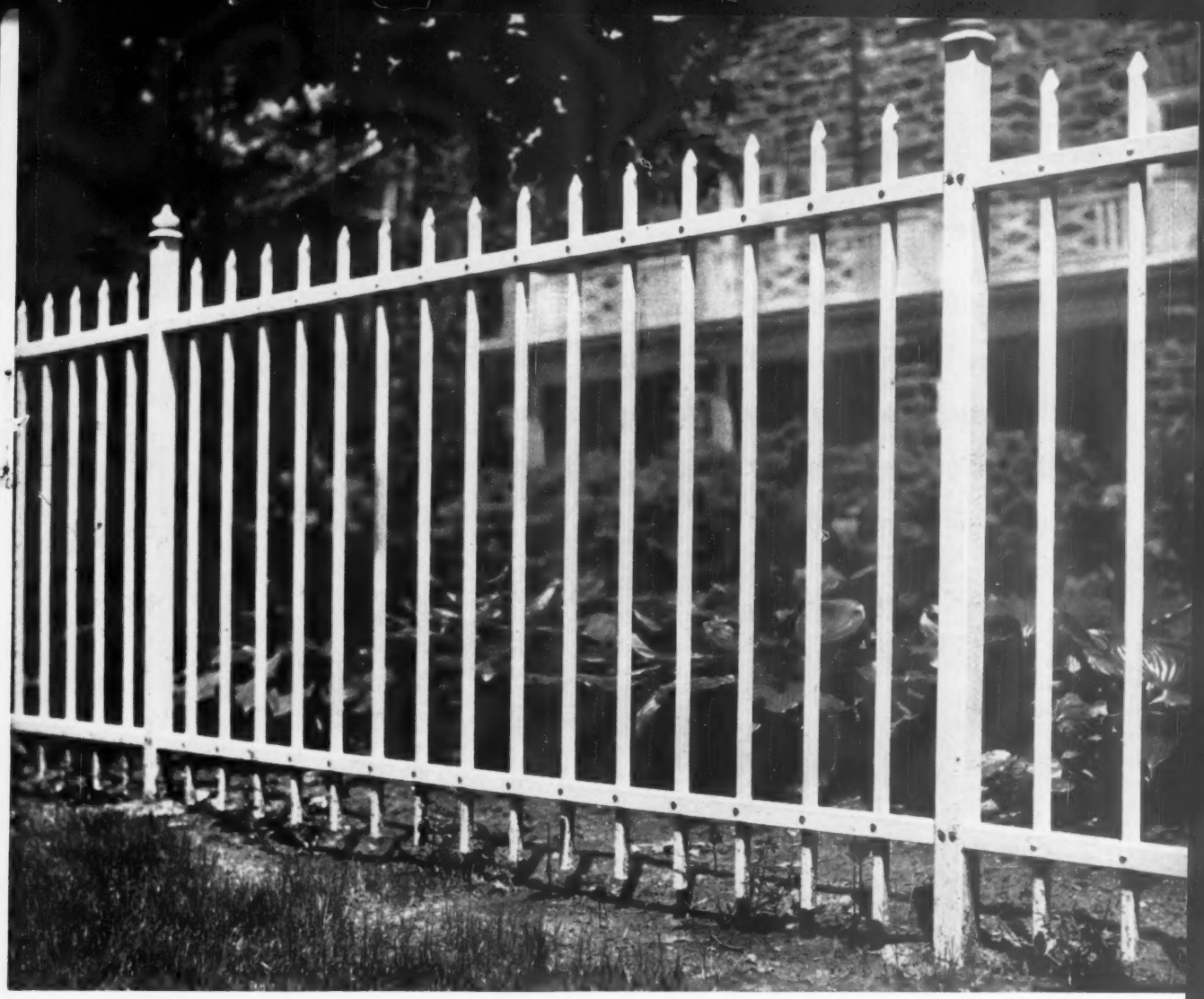


New kind of ornamental picket fence possible only with sheet steel

This classic picket fence combines eye-appeal and rugged protection—thanks to the strength and versatility of sheet steel.

Westmoreland Metal Manufacturing Company, Philadelphia, Pa., fabricates the fencing from coils of Bethlehem steel sheet. Posts, pickets, and stringers are formed into round welded tubing which is then pressed into a square cross-section. The machine that cuts the pickets to length simultaneously forms the pointed ends.

Finished inside and out with a tough vinyl coating, this sturdy steel fence holds its elegant appearance for many, many years. If the product you make calls for strength, durability, easy fabrication, and low cost, what material can possibly match sheet steel?

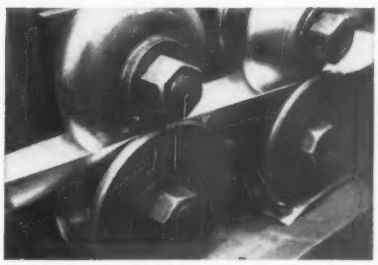
BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

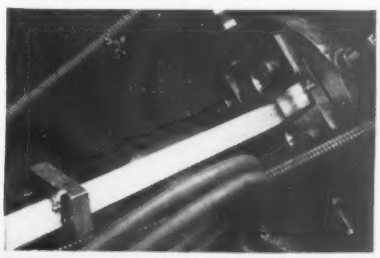
Steel

for Strength
. . . Economy
. . . Versatility

BETHLEHEM STEEL



The mill that forms and welds the galvanized steel strip into tubing (above) also squeezes it into the final square cross-section (below).



Landis Truform dresser adds new accuracy to centerless grinding

- assures exact duplication of profile on the wheel
- delivers consistent, repetitive accuracy with minimum attention
- eliminates time lost in reworking profile bars
- dresses profiles in either direction up to 60°
- saves on diamond costs

LANDIS TRUFORM DRESSERS

This new 12R Centerless grinder is equipped with shake-free, preloaded ball slide Truform dresser

LANDIS

LANDIS TOOL COMPANY, WAYNESBORO, PA.

AUTOMATIC CAMSHAFT HARDENING

...one of many ways High Frequency Induction Heat-Treating can increase production and reduce costs!

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AM makes versatile heat-treating equipment for production runs or specialized jobs. Our experience in all types of heat-treating applications can produce cost and quality advantages in your specific work.

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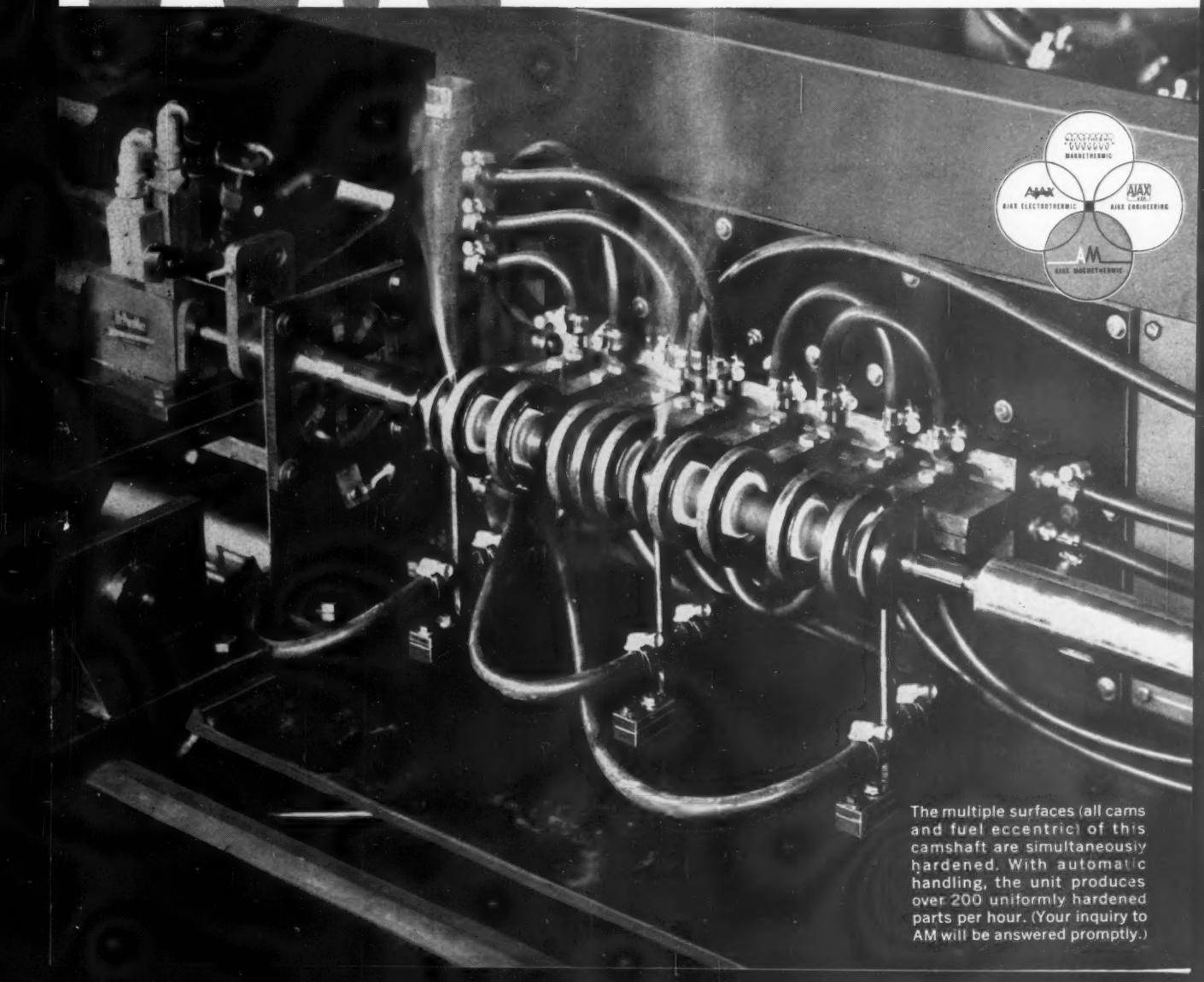
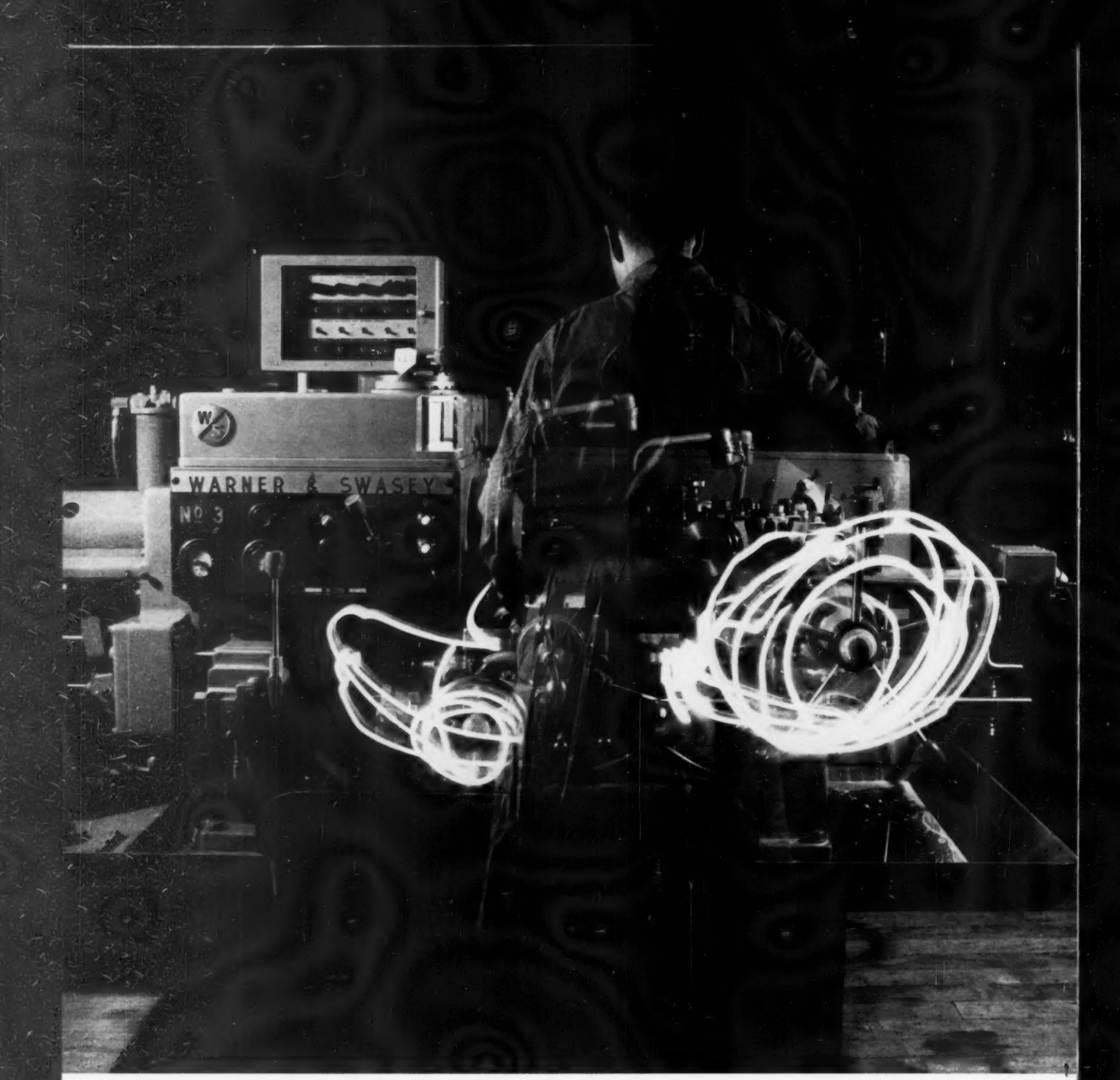


The multiple surfaces (all cams and fuel eccentric) of this camshaft are simultaneously hardened. With automatic handling, the unit produces over 200 uniformly hardened parts per hour. (Your inquiry to AM will be answered promptly.)



Hands off the headstock! Electro-Cycle automates spindle start, stop, reverse and speed changes throughout the entire machining cycle. With headstock handling eliminated, the operator develops a highly efficient rhythm for fast-cycle production. Turret lathes with exclusive Electro-Cycle control are built by The **Warner & Swasey** Company, Cleveland.

Report on Scrap

Almost every metalworking plant has steel scrap to dispose of. Questions like "what prices will it bring over the next six months?" are answered by Market Editor Bill Rooney in the article on Page 177.

Bill's 43 years' experience with Penton Publishing Co. has given him a wide knowledge of markets. He edited Penton's *Great Lakes Red Book* and rose to managing editor of the *Daily Metal Trade*, a newspaper once published by the company.

Coming Up

Next week, STEEL presents the 1961 edition of its Metal Selector. Some 2000 alloys will be listed in the most up-to-date compendium available anywhere.

More than 1000 changes have been made since the 1960 job. The biggest: The addition of a section on refractory metals and the use of the copper industry's new number system for copper alloys.

Metallurgical Editor Ed Case handled the Selector.

Bound reprints will be available at 50 cents a copy; prices for larger quantities can be had on request. Write Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.

Incidental Intelligence

Item: Drilling rigs sunk into the ocean floor during offshore oil exploration near Los Angeles resulted in the creation of a prime fishing area where none had existed before, *Oil Facts* reports. The fish were attracted by barnacles and vegetation that sprouted on the rig supports.

Who's Consistent?

Glenn Dietrich, associate copy editor, points out that STEEL runs data on nonferrous castings from the Non-Ferrous Founders' Society and die-casting figures from the American Die Casting Institute. It's United Steelworkers of America, but United Auto Workers. Ferroalloys are made by Ohio Ferro-Alloys Corp. We discuss gray iron castings, but some call them grey iron. We say conveyor, yet Mathews Conveyer Co. prefers the "e." Those are "style" matters which we'd discuss in full if we could get ten (or 10) pages.

'Let George Do It'

In our Sept. 18 column, we asked who originated the phrase, "Let George Do It." First in with the correct answer was Samuel Sass of General Electric Co., Pittsfield, Mass. It originated with King Louis XII of France. He made the remark in a satirical reference to his prime minister, Cardinal Georges D'Amboise.

C. C. Edelen of Surface Combustion Corp. and Elmer H. Snyder of Austin-Western offer the addendum that the phrase was popularized by George McManus in his comic strip of the early 1900s which bore that name.

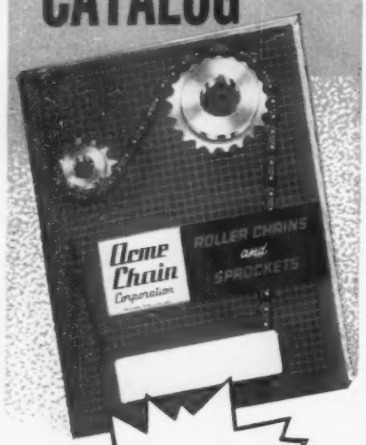
Captions by Geraldine

So many of you liked the substitute picture caption we ran Sept. 25 that we're going to let Geraldine have her fun again. She's the cleaning woman and our night editor. She finds the photos that the editors stockpile and gleefully writes new captions without regard for the more sedate original and without regard for corporate images.

We hope that if we let her get this prankishness out of her system, she'll eventually calm down.

STEEL, the metalworking weekly, is selectively distributed without charge to qualified management personnel with administrative, production, engineering, or purchasing functions in U. S. metalworking plants employing 20 or more. Those unable to qualify, or those wishing home delivered copies, may purchase copies at these rates: U. S. and possessions and Canada, $10 a year; all other countries, $30 a year; single copies, 50 cents. Metalworking Yearbook issue, $2. Published every Monday by The Penton Publishing Co., Penton Bldg., Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

ACME'S *NEW* ILLUSTRATED CATALOG



JUST OFF THE PRESS

A PRACTICAL ENCYCLOPEDIA OF POWER TRANSMISSION PLANS AND IDEAS!

This new 106-page ACME catalog is of tremendous help in the planning and application of roller chains in power transmission drives. There are 35 examples of chain drive layouts and engineering data. It also contains complete information, including prices, on roller chains, sprockets, standard and made-to-order conveyor attachments.

We'll be glad to send you a copy FREE Write Dept. 10-y today.

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New Forging Idea News

How to Improve Parts Design with This Fresh Approach to Forging

Design Refinements suggested by COMMERCIAL'S forging experts make many parts in use today better, more economical. Here are detailed examples of only three COMMERCIAL upset forgings which demonstrate how these design refinements have resulted in superior OEM parts at lowered cost.

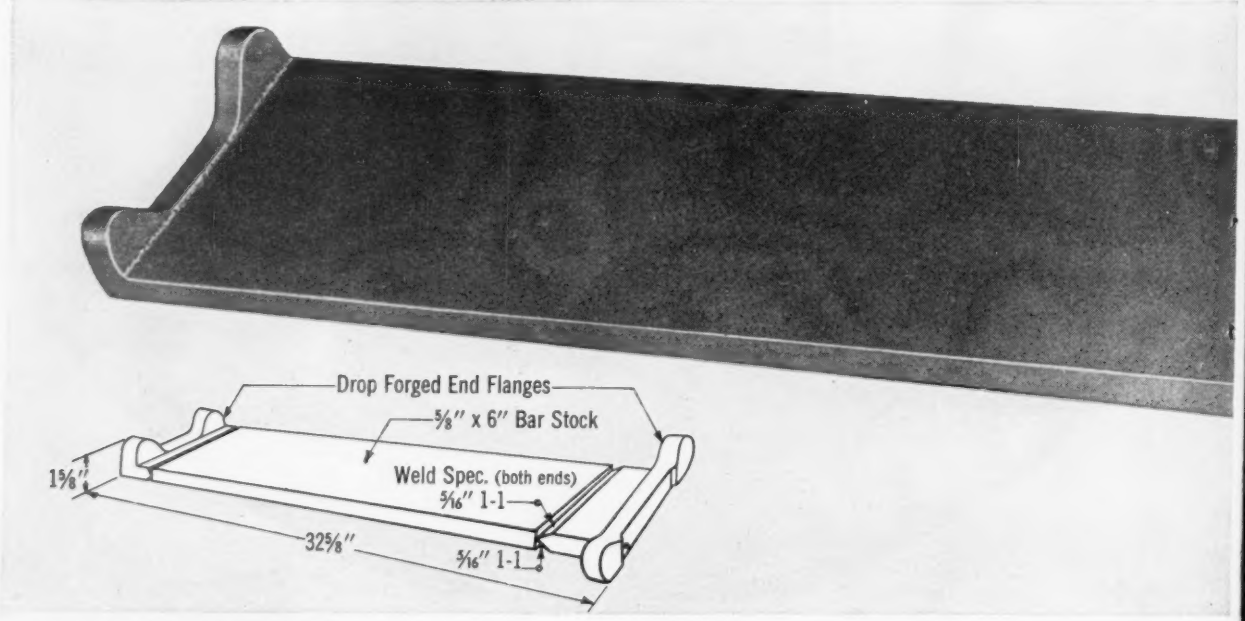
Quality Forgings start with "Forging Quality" rolled steel...closely controlled in its making to eliminate defects, to obtain surface and interior soundness, to refine grain structure into a directed fibrous flow. Upset Forgings in closed dies produces by squeeze pressure a "looped" grain flow and permits concentration of grain density at points where the service stresses are calculated to be the greatest. Also, control of the directioning of the inherent fiber-like structure provides for maximum strength of the metal at required stress points. Not only are the properties of the metal improved in all directions, but also the metal structure is refined and compressed resulting in a structural uniformity that renders the metal remarkably free from concealed defects. Result: Tough, strong part—free of hidden defects and surface flaws.

Advantages of Upset Forgings

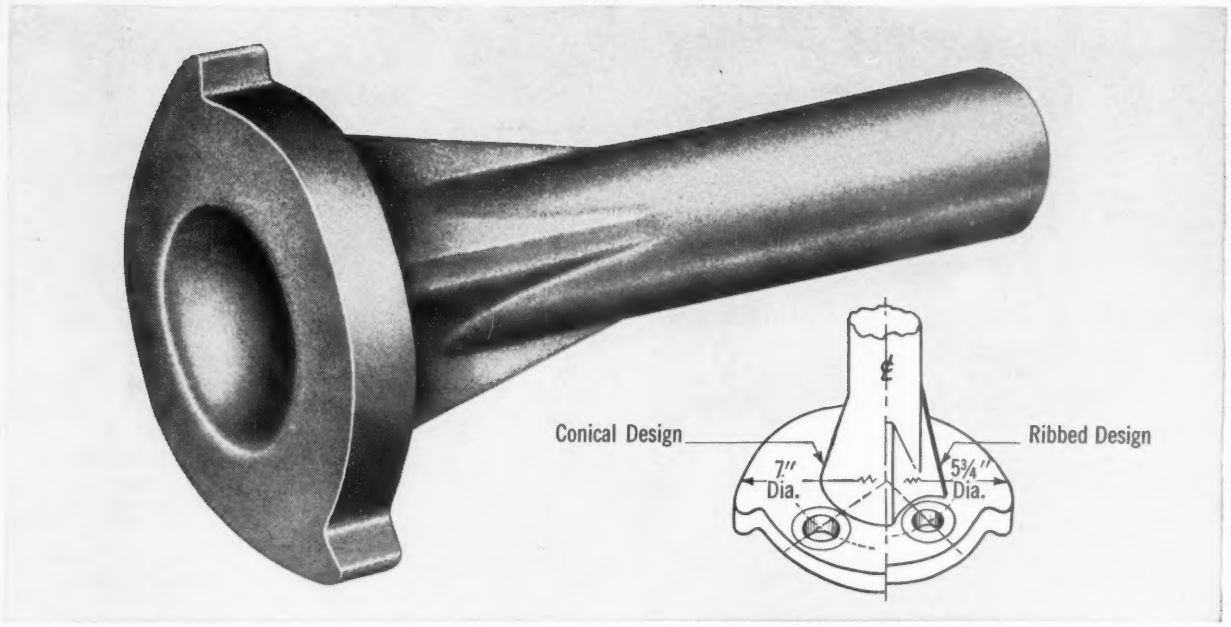
- *Uniform strength, toughness and high fatigue resistance insure longer, more dependable service life for equipment.*
- *Parts made closer to finished dimensions—cuts scrap, reduces machining and finishing time.*
- *Components can be assembled by simple production methods into complex parts.*
- *Uniform response to heat treatment gives desired physical properties of precise degree.*
- *Higher strength-to-weight ratio obtainable—a vital factor in the design complexity of parts for the future.*

Features of Upset Forging by COMMERCIAL

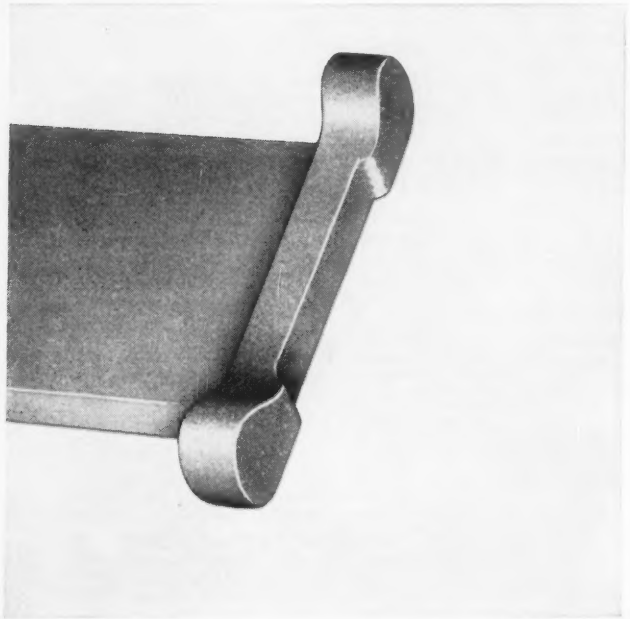
- *Batteries of upsetters from 1½" to 8"—custom or production runs.*
- *Hydra-Jet descaling prior to forging reduces imbedded surface scale.*
- *Magnetic particle depth inspection to detect metal faults before shipment.*
- *"Task Forging" team steeped with experience in producing the unusual upset forging.*



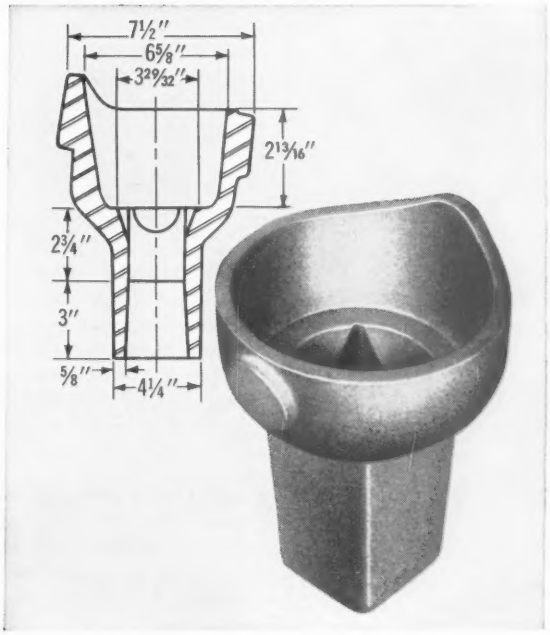
FORGING REPLACES WELDMENT—Structural side bar for agricultural tractor was formerly fabricated from ⅝" x 6" mill-edge bar stock and two drop forged end flanges. COMMERCIAL'S redesign called for a homogeneous "metal quality" upset forging. Controlled, fiber-like grain structure is concentrated at stress points. All welding and grinding is eliminated. Warpage disappeared and surfaces are smooth ready for final high lustre finish. Except for automated drilling of holes, now possible due to close tolerance forging, the part is ready for assembly line. Customer benefits have decisively proved the advantages of COMMERCIAL'S "Task Forging" team know-how.



FRESH APPROACH DESIGN SAVES 25%—Lower front end steel tractor spindle, if produced to conventional design, presented excessive weight problem. Symmetrical conical taper from shank to cam head called for 45 lbs. blank weight. COMMERCIAL produced the part to the ribbed taper design with 34 lbs. blank weight. Here is an excellent example where closed die forging most efficiently positions quality metal. Even the cam ears were upset to exact size and location. Result: Smaller part with ample strength, important cost benefits.



While designs are on the board, call on COMMERCIAL'S "Task Forging" team to collaborate with you. Many other ingenious solutions by COMMERCIAL to tough forging problems are detailed in Bulletin 600-P1. Write Commercial Shearing & Stamping Company, Dept. L-41, Youngstown 1, Ohio.



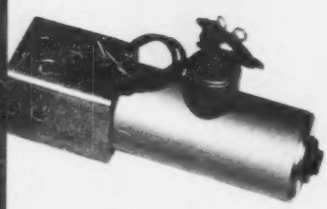
UNIQUE FORGING SUPPLANTS CASTING—Unusually shaped axle trunnion socket seemingly was a natural for casting because of a symmetrical trunnion end plus external boss. COMMERCIAL produced the part to finished size via closed dies in an 8" upsetter. Metal had to be displaced both internally and externally. Result: Rejects cut way down, less machining, stronger part, weight reduced, metal saved.

When it's a vital part, design it to be FORGED

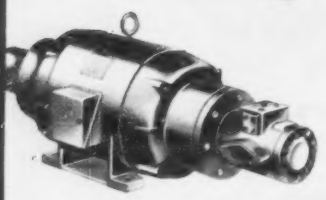
COMMERCIAL
shearing & stamping

BURGMASTER USES THESE VICKERS COMPONENTS

POWER PACKAGES—A complete Vickers 30-gallon hydraulic power supply was custom-designed and built for this machine. Vickers offers standard and custom power packages to meet every type of application need. Get details from your Vickers application engineer.



DIRECTIONAL VALVES—Two types of directional valves—solenoid operated and solenoid controlled, pilot operated—are used on this Burgmaster machine. The complete Vickers line of two- and four-way directional control valves is described in Catalog 5001C.



MINIATURE DIRECTIONAL CONTROLS—Series D1L two and four-way valves are designed for low volume systems, are suitable for operation to 1000 psi and have 2 gpm capacity. Low current a-c and d-c solenoids are available in all standard voltages. Write for data sheet D1L-1.

MOTOR PUMPS—A 5 HP, double-end motor pump is used on this Burgmaster. The complete Vickers motor pump line offers single, double, two-pressure and two-stage pumps. Use of these motor pumps conserves space and eliminates alignment problems between pump and motor. Details are available in Catalog 5001C.

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ADMINISTRATIVE and ENGINEERING CENTER

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CALENDAR
OF MEETINGS

Oct. 12-15, National Screw Machine Products Association: Fall meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: 2860 E. 130th St., Cleveland 20, Ohio. Executive vice president: Orrin B. Werntz.

Oct. 15-20, American Institute of Electrical Engineers: Fall general meeting, Statler Hilton Hotel, Detroit. Institute's address: 33 W. 39th St., New York 18, N. Y. Secretary: N. S. Hibshman.

Oct. 16-18, Magnesium Association: Annual convention, Belmont Plaza Hotel, New York. Association's address: 122 E. 42nd St., New York 17, N. Y. Executive secretary: Jerry Singleton.

Oct. 16-19, American Vacuum Society: Second international congress on vacuum technology, Sheraton Park Hotel, Washington. Society's address: Box 1282, Boston 9, Mass. Secretary: Harold C. Weingartner.

Oct. 17-18, American Society of Mechanical Engineers: Material handling conference, Pick Nicollet Hotel, Minneapolis. Society's address: 29 W. 39th St., New York 18, N. Y. Secretary: O. B. Schier.

Oct. 17-19, American Society of Lubrication Engineers and ASME: Annual lubrication conference, Morrison Hotel, Chicago. Society's address: 5 N. Wabash Ave., Chicago 2, Ill. Executive secretary: Calvert L. Willey.

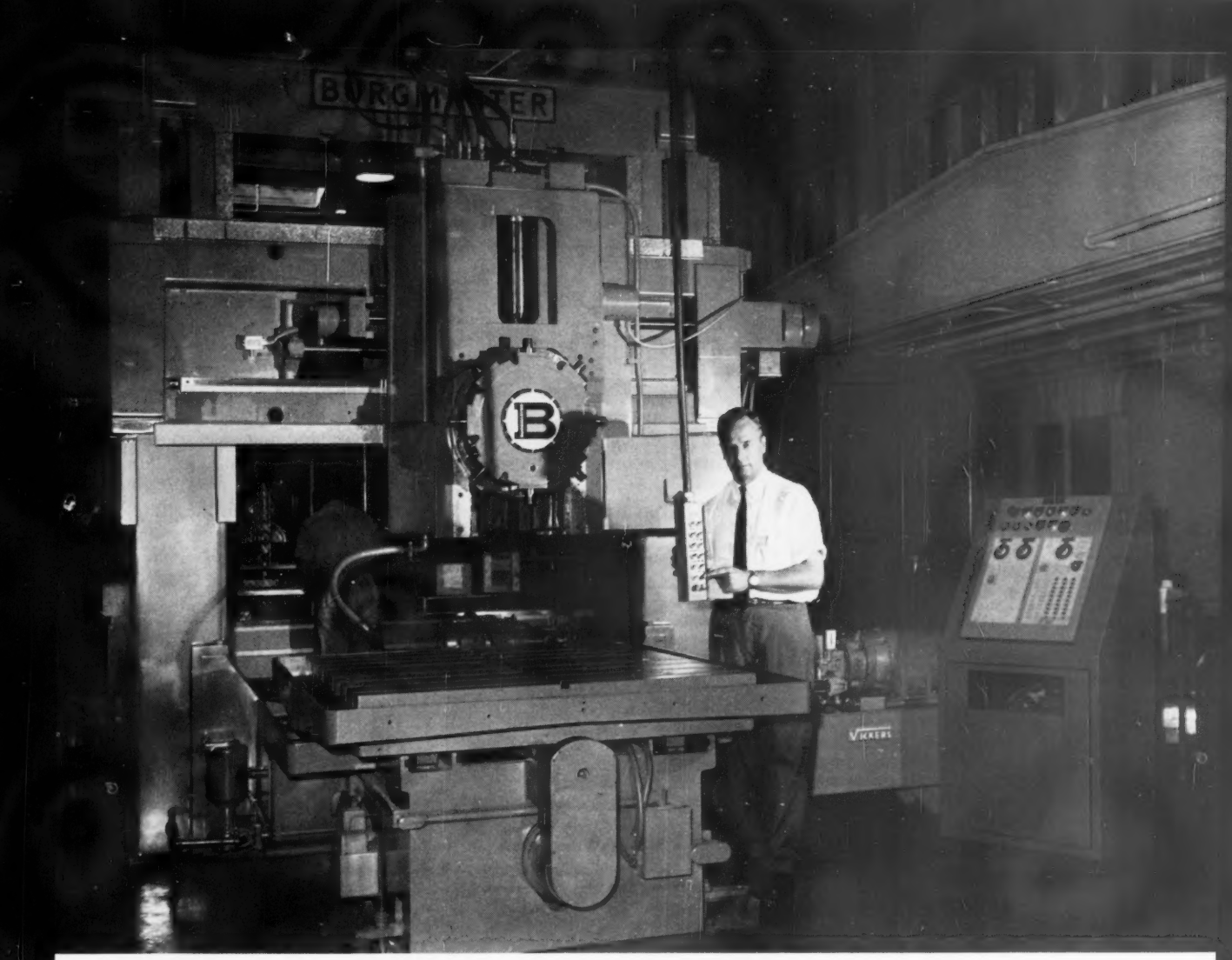
Oct. 18-20, Gray Iron Founders' Society Inc.: Annual meeting, Royal York Hotel, Toronto, Ont. Society's address: 930 National City-E. 6th Bldg., Cleveland 14, Ohio. Executive vice president: Donald H. Workman.

Oct. 18-20, Packaging Institute: Annual forum, Biltmore Hotel, New York. Institute's address: 342 Madison Ave., New York 17, N. Y. Executive director: Chas. A. Feld.

Oct. 18-22, National Association of Secondary Material Industries Inc.: Fall meeting, Atlantic Division, Shelburne Hotel, Atlantic City, N. J. Association's address: 271 Madison Ave., New York 16, N. Y. Administrator: M. J. Mighdoll.

Oct. 19-20, American Society for Quality Control: Midwest conference, Chase-Park Hotel, St. Louis. Society's address: 161 W. Wisconsin Ave., Milwaukee 3, Wis. Administrative secretary: W. P. Youngclaus Jr.

Oct. 19-21, Foundry Equipment Manufacturers Association Inc.: Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va. Association's address: Suite 202, 1 Thomas Circle, Washington, D. C. Secretary: C. R. Heller.



ANTTI RAIHA, CHIEF ENGINEER, BURGMASTER CORP. SAYS:

"Hydraulic and tape controlled turret drills need sensitive, reliable power systems..."

". . . in order to control tool penetration and table positioning where location tolerances must be held to .001-inch. We've worked with Vickers hydraulic power systems since 1951, beginning with our automatic hydraulic models, we are increasing our activity in this area as the demand for turret drilling machines and tape controlled machines grows.

"In addition to the machine shown, we use Vickers hydraulics on seven different standard models as well as on many specially designed variations of these standard machines. We rely on Vickers hydraulic power systems, not only for their unusually high quality, but because they are easy to maintain and we have the additional assurance of the availability of their worldwide service organization.

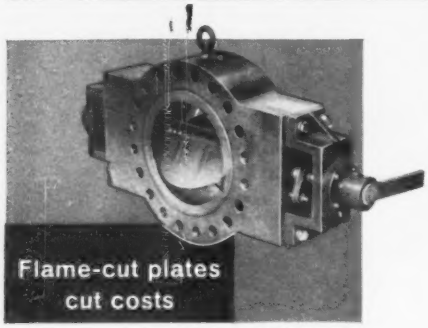
"Because Vickers application engineers have given us close cooperation and have a thorough understanding of our requirements, we've been able to develop systems that provide long, trouble-free life."

Whether you are building standard or special purpose machinery, your power and control requirements can be met precisely and economically by the proper application of hydraulic systems. Typical Vickers components and systems used by Burgmaster are shown on the facing page. They are part of the broadest line of top quality hydraulics available anywhere.

VICKERS

VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
Machinery Hydraulics Division
ADMINISTRATIVE and ENGINEERING CENTER
Department 1480 • Detroit 32, Michigan

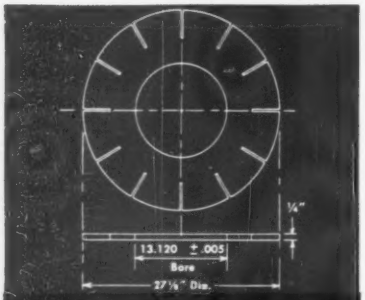
METALOGICS* IN



Flame-cut plates cut costs

HIGH REJECTS: Use of flat steel castings for valve bodies, with I. D. ranging from 4" to 60", accounted for increases in costs for this manufacturer. Pattern costs rose because of numerous changes . . . rejects were high due to porosity and other casting faults that showed up only after machining.

HIGH QUALITY: Ryerson recommended using flame-cut plates ranging in thickness from 1" to 8". Results: greater production flexibility, faster delivery, lower cost and a stronger product for this high-pressure service. Tight Ryerson quality control delivered plates of exceptionally clean surface to exact thickness of finished product, requiring little machining.



Machine cut rings solve problem

PLATES REQUESTED: Ryerson was asked to bid on supplying ¼" Type 410 stainless in 27½" square plates. Material was to be used for orifice plates for 16" burner, subjected to elevated temperatures.

RINGS RECOMMENDED: Going beyond material specs, the Ryerson representative found that the customer intended to cut plate into 27⅛"-diameter rings with 13.120" bore—and then mill 12 slots in outer diameter for expansion relief. Knowing the application, Ryerson recommended supplying machine-cut rings in which slots could then be punched rather than milled. Production savings enabled switching to Type 304 at less cost than Type 410 with slots milled.

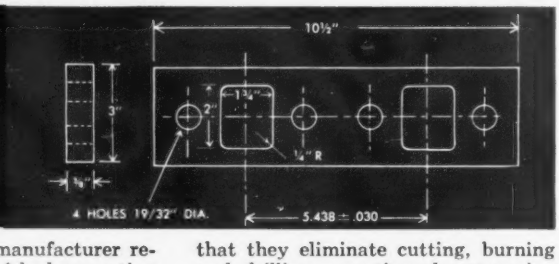
Look at these random examples and see how Ryerson Metalogics sparks real savings by continually searching for and suggesting new materials, methods and techniques.

The broadest experience anywhere combines with the widest range of stocks available to offer you unbiased recommendations on the best material for any job—be it steel, aluminum or plastics. Always the right metal-fabricating machine, too—for Ryerson is the nation's largest distributor.

Your Ryerson representative is "Metalogics-trained" to help you *value-analyze* selection, fabrication and application problems. Get his constructive ideas soon, and see how he can help you select and apply material from our vast stocks. It's the "Metalogical" thing to do.

**The Ryerson science of giving optimum value for every purchasing dollar.*

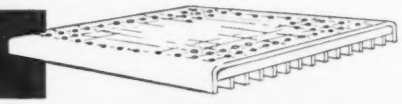
Saved: $100 per thousand



PROBLEM: Muffler manufacturer required accurately finished mounting plates made from ⅜" x 3" bar. Cutting bars to size, burning 1¾" x 2" holes and drilling four 19/32" holes proved time-consuming and expensive.

SOLUTION: Ryerson recommended that they eliminate cutting, burning and drilling operations by stamping the part from Ryerson forming-quality plate. One operation instead of three cut costs $100.00 per thousand pieces and quickly justified the small initial investment in dies.

Suggestion saves 85%



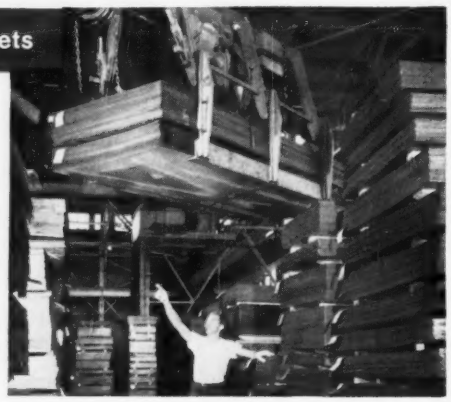
ASKED FOR: Customer wanted 1" hot rolled plate to cover about 80' of 24" open trench. Plate was to be cut into 24" x 27" segments—each containing 900 ⅜" holes to filter the product.

RECOMMENDED: After studying application and cost, Ryerson recommended a design combining perforated light plate, formed to channel shape, and grating for structural support. Ryerson experience and imagination saved 85% of the original cost.

Soft touch on fabricating sheets

THE NEED: Cold rolled sheets that would take severe forming and retain smooth, dull surface for high lacquer finish. Sheet quality was found on inspection to vary widely from one shipment to the next, causing variations in forming and finishing operations . . . high reject rate.

THE ANSWER: The Ryerson representative showed how our stringent quality controls would assure consistent quality on every shipment so that forming and finishing could be standardized for better results . . . lower production cost figures.



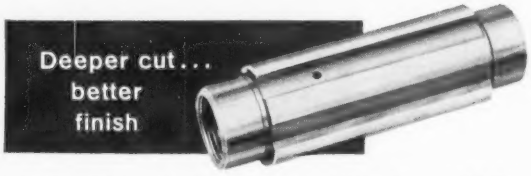
ACTION

BEFORE: Job shop was using MT 1015 tubing in the manufacture of this coupling. Machinability was satisfactory, but rising costs of operation led to a search for ways to economize.

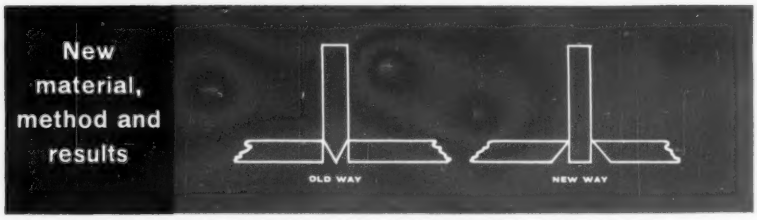
AFTER: Careful study by the Ryerson representative brought about a change in material. He recommended using Ledloy® 170 tubing, which increased machining speed to 170 s.f.m. and stepped up production 30%. Ryerson's stocks include the widest range of fast machining alloys—types and sizes to fit your every need.

OLD WAY: A screw machine shop used nylon in the manufacture of nipple adapter and coupling nuts—until a Ryerson representative came on the scene.

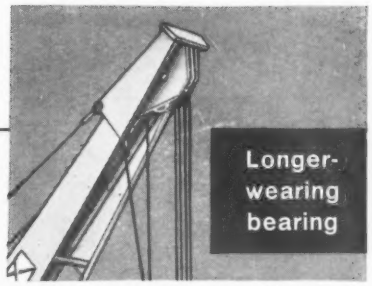
NEW WAY: At his suggestion, they changed to Ryertex-Omicron PVC—cut costs 50%. PVC machined better—to closer tolerances, with improved finish . . . ran faster without "gumming." Note exact cutting of threads and barbs. Threads fit perfectly.



SEARCH: Complicated machining of a carbide grade gear shaft included cuts up to ½". It was discovered that required machining was too slow with the steel chosen for the job.
ANSWER: Rycut® 40 was recommended by the Ryerson representative. This free machining alloy fit the situation perfectly. The company found that Rycut 40 machined at 250 s.f.m., gave a better finish, increased tool life, and lowered total per-piece cost. An alloy in the Rycut series may well lower your costs.



OLD: Rows of vertical aluminum grid members were attached to an aluminum base plate by notching the grid members and welding. (2024-T3 aluminum plate was used.) However, upon cooling, welds fractured—causing a high reject rate on this assembly.
NEW: A Ryerson representative suggested undercutting the base plate (as shown) instead of the grid members. This exposed a greater area to heat and permitted a larger deposit of weld material. Another Ryerson suggestion: change material to 5052-H34 aluminum, which responds better to welding operations.



5-DAY LIFE: The sheaves that guide the enormous digging buckets of underwater dredges take a very severe load. Bronze bearing in the sheaves had to be replaced every four or five days.

5 MONTHS, SO FAR: After discussing the problem with a Ryerson man, the chief engineer decided to try a bearing made of Ryertex. The change was made, and five months later hardly any wear was noticeable! With its low friction coefficient, Ryertex is nonbinding, even on itself.

2 metalworking machines for the price of 1

A fabricator of stainless steel kitchen equipment was recently in the market for a new squaring shear. The one under consideration had a gap-type frame which would enable him to do an important notching operation—necessary for certain sink tops. After careful study, a Ryerson machinery specialist recommended *two* pieces of equipment instead of one at no increase in total cost. The first, an underdriven shear. The second, a universal-type sheet metalworking machine that would do the required notching, plus many other jobs—adding versatility to the entire operation.

PRODUCTS IN STOCK

STEEL—carbon, alloy, and stainless steel—bars, structurals, plates, sheets and strip, tubing, etc.

ALUMINUM—sheet (including new building sheet), plate, coils, rod and bar, tubing and pipe, building products, etc.

INDUSTRIAL PLASTICS—Ryertex-Omicron PVC in all forms. Also Ryertex® laminated phenolic plastics for bearings.

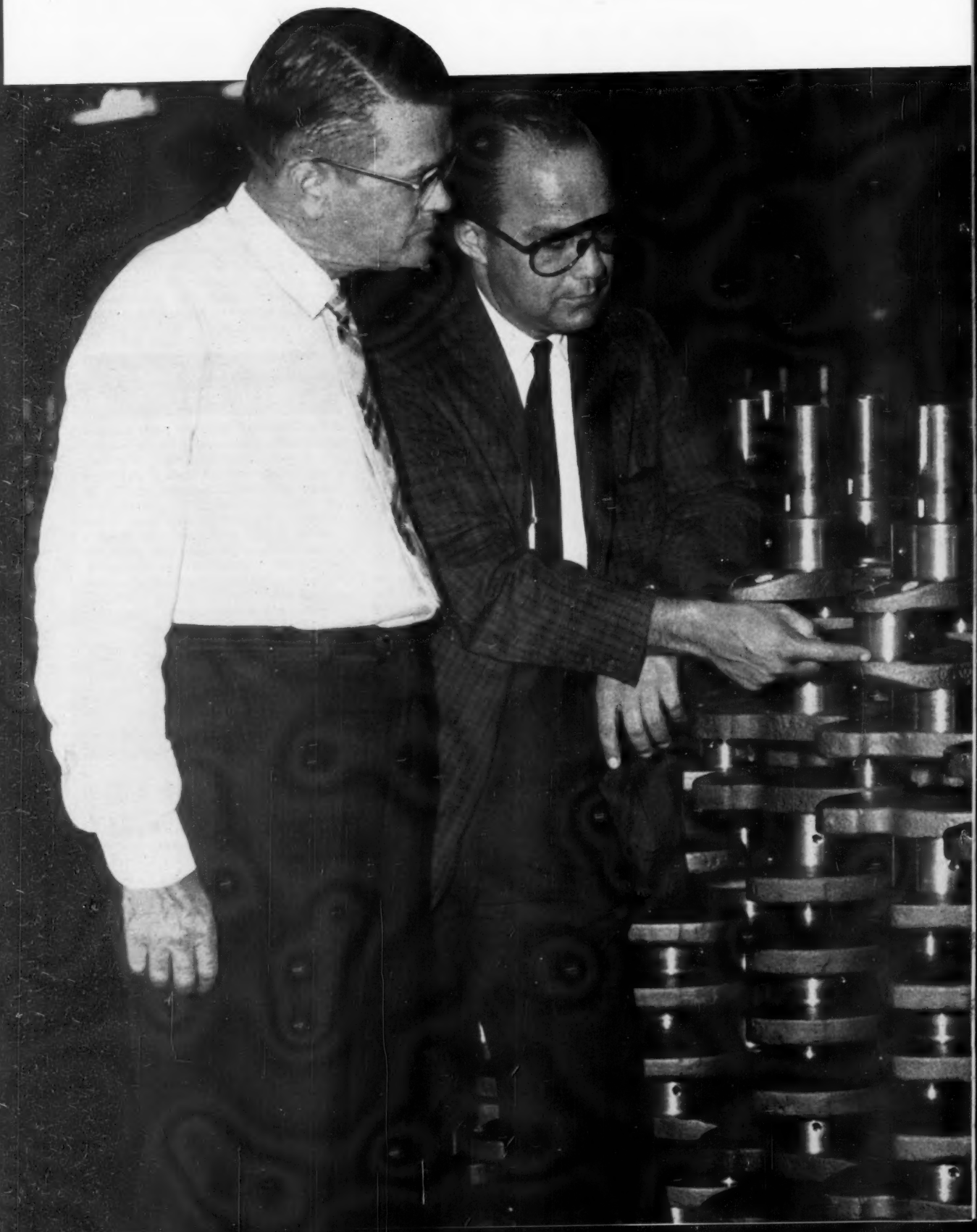
METALWORKING MACHINERY—the broadest line available from a single source for every kind of metal fabrication. Also specialized line of material handling equipment.

RYERSON METALOGICS

JOSEPH T. RYERSON & SON, INC., MEMBER OF THE INLAND® STEEL FAMILY

STEEL · ALUMINUM · PLASTICS · METALWORKING MACHINERY

How Norm Nesbitt and Allen Moore



teamed up to cut dressing costs 50% at ATLAS CRANKSHAFT

This is a good example of the way it sometimes pays to break a habit even when it's a pretty *good* habit.

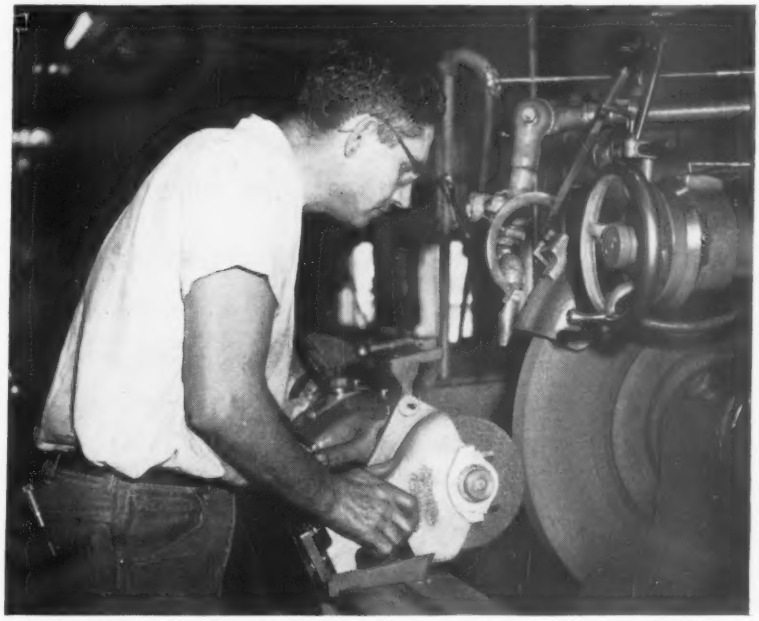
At Atlas Crankshaft Corp., in Fostoria, Ohio, the dressing wheels that are used to keep big crankshaft grinding wheels at peak performance play a very important part in maintaining production at a high and constant volume. There was nothing really wrong with the 6″ dressing wheels Atlas had been using for years. They did a pretty good job and usually lasted through an 8-hour day.

But Atlas' Purchasing Agent Norm Nesbitt wasn't content with "good enough". He wanted "better" and had his eye firmly fixed on no less than "best". He got hold of Bay State representative Allen Moore and told him to go to work on the problem.

Moore is thoroughly accustomed to the kind of abrasive problems that require long and painstaking analysis. But this time, he found that it was a case of the solution being so simple that nobody had thought of it.

He simply recommended a larger dressing wheel . . . an 8-inch wheel instead of the 6-incher that was being used. Both wheels were stubbed at 4″ but buying the larger wheel reduced the cost per cubic inch of usable abrasive 50% and cut the number of dressing-wheel changes from one a day to one every two days.

Not all abrasive problems are as easily solved as this one, of course. But the point of this case is both simple and important: The most obvious improvements in grinding operations are often the most difficult to spot. Your Bay State distributor and our direct representatives are thoroughly *trained* to spot the obvious and to *dig* for what is not obvious. You can't lose and you may well gain substantially by just turning them loose to analyze your grinding operations. *Better grinding at lower cost . . . that is their business.*



Atlas operator Paul Huff sets new 8″ dressing wheel against surface of big, crankshaft grinding wheel. 8″ diameter dressing wheel lasts twice as long as 6″ wheel because both are stubbed at 4″ and 8″ wheel costs half as much per cubic inch of usable abrasive.

Norman Nesbitt, left, as purchasing executive for Atlas Crankshaft Corp. for 15 years, has encountered, and successfully met, every purchasing problem "in the book" . . . and then some!

Allen Moore, abrasive specialist, with many years experience with distributors and grinding wheel manufacturers, has a broad knowledge of abrasive wheel applications. His Business Administration degree attests to his awareness of cost-savings importance.

BAY STATE ABRASIVES

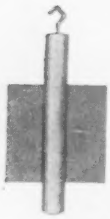
BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Chicago, Cleveland, Detroit, Los Angeles, Pittsburgh. *Distributors:* All principal cities.

. . . and all others who require quality rods and bars !

There's no substitute in the exacting Fastener Trade for "know-how". Seaway personnel is thoroughly familiar through years of experience with the needs of the Fastener and Forging trades...and this "know-how" extends from the front office right straight through the plant and rolling mill. The broad fastener experience of our staff is at your disposal.

SPECIAL ANALYSIS ● *SPECIAL SURFACE FINISHES*
SPECIAL HARDNESS ● *SPECIAL HEAT TREATING*
QUALITY-FORGING AND COLD HEADING



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Defense: Prime Factor in 1962 Economy

The prime mover in 1962's growing economy will be the defense market, forecasters predicted last week at American Management Association's annual sales forecasting forum. "It's going to be the biggest defense market since the Korean War, and there is a strong possibility that deficit financing of the increased cost will cause inflationary pressures," said John H. Sidebottom, vice president-marketing, RCA Defense Electronic Products Div., Radio Corp. of America. He cited these key factors: Increased ordering of limited warfare weaponry and increased expenditures on research and development.

Small Steel Speaks Out

Daniel B. Nelsen Sr., president (left), and son, Clifford, vice president, Nelsen Steel & Wire Co., say they don't want a steel price increase because it will put the industry at an even greater disadvantage in world markets. These representatives of small steel (they employ less than 100 production workers) assert that the alternative is realistic depreciation—see Page 76. It would permit rising costs to be absorbed and might even permit a price decrease. "The choice rests not with the steel industry, but with the federal government," they add.

Higher Prices Reflect Business Upswing

September price levels reflected the quickening tempo of business activity, says the National Association of Purchasing Agents. The number of members reporting higher prices climbed from 10 per cent in August to 20 per cent in September. Seventy-four per cent said prices were largely unchanged, down from August's 83 per cent.

Consumers Will Loosen Up Soon, Says Hodges

A "rather substantial" gain in retail sales is not far off, claims Commerce Secretary Luther H. Hodges. He believes increased sales of manufacturers, wholesalers, and retailers in August point to further improvement in retail sales. People have held back on spending, but confidence in the economic outlook and a better feeling about the international situation should cause them to "loosen up."

Labor's Turn for 'Hold the Line' Appeal Next Year

The Kennedy administration intends to urge "responsible" wage bargaining by the United Steel Workers next year with the same intensity it appealed

for price stability this fall, says Labor Secretary Arthur Goldberg. "We can be assured that the administration will speak with equal clarity on both prices and wages," he states.

Construction Awards Slip from August High

Highway, utility, and apartment construction lifted building contracts to an August record, F. W. Dodge Corp. reports. Contracts hit $3.5 billion, up 8 per cent from those in August, 1960. But September results may be a little off the pace. *Engineering News-Record* says heavy construction awards in September slipped 7 per cent below the August, 1961, and September, 1960, figures.

War Babies Will Spur Household Buying

The wartime baby crop is reaching the marriageable age, says Prentice-Hall Inc. Second only to the teen age group in rate of growth, the 20 to 24 age segment will expand 7 per cent by mid-1963, the firm estimates. The prospective gain in household formations will create bigger markets for furniture and appliances and should spur housing demands by the fourth quarter of 1962, or early 1963.

New STEEL Feature Makes Debut

Is the U. S. dollar still showing signs of weakness? Will Australia pull out of its recession? Can German industry boost productivity enough to compensate for wage hikes? Answers to those questions—and more—are found in STEEL's new monthly feature, "The Trader's Horn," Page 78. Author of the feature is S. J. Rundt, New York consultant on international business (and a consultant to STEEL INTERNATIONAL). Economist, world trader, financial adviser to big business, market analyst—all those terms fit Mr. Rundt. His background includes a six-year stint as chief of counterespionage at General Mark Clark's headquarters, work as a representative of Swiss banks in Germany, and a personal citation from General Eisenhower and the British imperial general staff.

Ford Motor's 1962 Models Total 185,000

Ford Motor Co. had built 185,000 new models when its workers went on strike Oct. 3. That's enough to last a month at current selling rates and will get sufficient numbers on the streets for the important advertising purposes that the initial cars perform. The company and the UAW had agreed on the economic package, which would be similar to the General Motors agreement. The snags last week came over noneconomic issues, including production standards, the number of union representatives, skilled trades problems, and matters at the Rouge steel mill.

GM Catching Up on New Models

General Motors Corp. produced 229,000 new models through today (Oct. 9). Because of its strike, GM built 94,000 in September instead of the 243,000 it had scheduled. Its new model output totaled 185,000 through Sept. 30. An estimated 44,000 have been assembled so far this month.

Allis-Chalmers Makes Temporary Salary Cutbacks

Allis-Chalmers Mfg. Co. cut the pay of about 13,000 salaried workers—5 per cent of base pay for those earning less than $10,000 a year, up to 25 per cent for those earning more. The company says the action is a "temporary economy measure to boost profit margins." Cost of living allowances, group insurance, and other benefits are not affected.

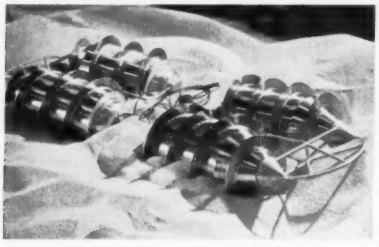
'Marketing Is Not a Profession'

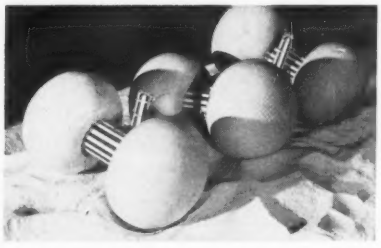
Marketing isn't a profession, but it may become one in time, asserts Albert W. Frey, president, American Marketing Association. "Our standards are too low," he says. "We need to know more about organization, buyer behavior, and product development. Most of all, we need to know how to measure the effectiveness of advertising." Nonmarketing people in business can help by giving marketing men more information, and educational institutions can aid by developing new knowledge and solving marketing problems.

Standard Material Specs Pay Off

Special material analyses can add to the cost of a part, lengthen delivery time, and limit sources of supply. That's why material and component producers, associations, and the government are furthering standardization. The story on Page 121 tells how many firms are cutting costs and improving designs by considering standard materials when parts are still in the drawing board stage.

Wheels, Tracks, Screws Tested for Lunar Vehicles





Land vehicles that can be used to explore the moon are being studied by the Defense Systems Div., General Motors Corp. The multiple screw vehicle (left) travels in loose or fluffy soil even when it is completely buried. Large doughnut shaped wheels (right) work well on irregular terrain. A third basic means of locomotion is a tracked vehicle that operates on soft or hard soil.

New Productivity Measurement Urged

"Accurate productivity measurement has become vital to prices, wages, profits, our standard of living, and our ability to compete with other nations," says Rev. William T. Hogan, director, Industrial Economics Program, Fordham University. He urges that a new productivity index be established—one that takes into consideration the contribution made by capital as well as manpower. He would include materials and machines in the computation. "Although

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Editorial index available semiannually

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manpower, materials, and machines all contribute to changes in the productivity rate, the commonly used measurement in the steel industry considers only manhours per ton of steel," Father Hogan says.

Supercomputers Coming in Decade

Tomorrow's computer will be smaller, more reliable, more easily man-communicable, less expensive, and more powerful than today's. Processing speeds will be rated in nanoseconds (billionths of a second). That's the prediction of Dr. Joseph A. Orlicky, director of production control, J. I. Case Co., Racine, Wis. One manufacturer is doing lab work on a magnetic drum with a capacity of 250 million characters. When will these supermachines be introduced? Within the next ten years, said Dr. Orlicky at the recent annual meeting of the American Production & Control Society in Chicago.

Where World Bank Loans of $610 Million Went

The International Bank for Reconstruction & Development reports 27 loans totaling $610 million were made in the last year. Here's a breakdown:

For:	Amount (Millions)	Borrower
Transportation	$311	Burma, Colombia, India, Japan, Thailand, Argentina, Chile, Mexico, Panama, Peru, Israel
Electric Power	125	Uganda, Ceylon, Japan, Colombia, Costa Rica, El Salvador, Norway, Yugoslavia
Agriculture	126	Pakistan, British Guiana, Mexico, Sudan
Industry	48	Japan, India, Pakistan

Straws in the Wind

President Kennedy has signed a compromise bill authorizing limited subsidy payments over a four year period to lead-zinc miners who since 1955 have not produced more than 3000 tons of the metals in any one year . . . Senator Estes Kefauver's (D., Tenn.) antitrust subcommittee has begun a preliminary investigation of the aluminum industry . . . Railroad freight car loadings in the fourth quarter will be 3.3 per cent above those of the like 1960 period, estimates the Association of American Railroads . . . Buick is recalling more than 1200 employees to step up production.

Metalworking Pulse

The Business Trend: Increased auto production between strikes led the way as STEEL's industrial production index reached 168 (1947-49 = 100) for the week ended Sept. 30. Output of electricity is in a seasonal decline. **Autos:** The increase in output at General Motors was expected to offset the decline at Ford Motor Co. during the week ended Oct. 7, resulting in about 110,000 units. **Steel:** The rise in steel ingot output is being held in check by labor unrest in the auto industry.

- **INDUSTRIAL PRODUCTION INDEX** (1947-49=100)
  - Week ended Sept. 30 . . . **168†**
  - Year ago **151**

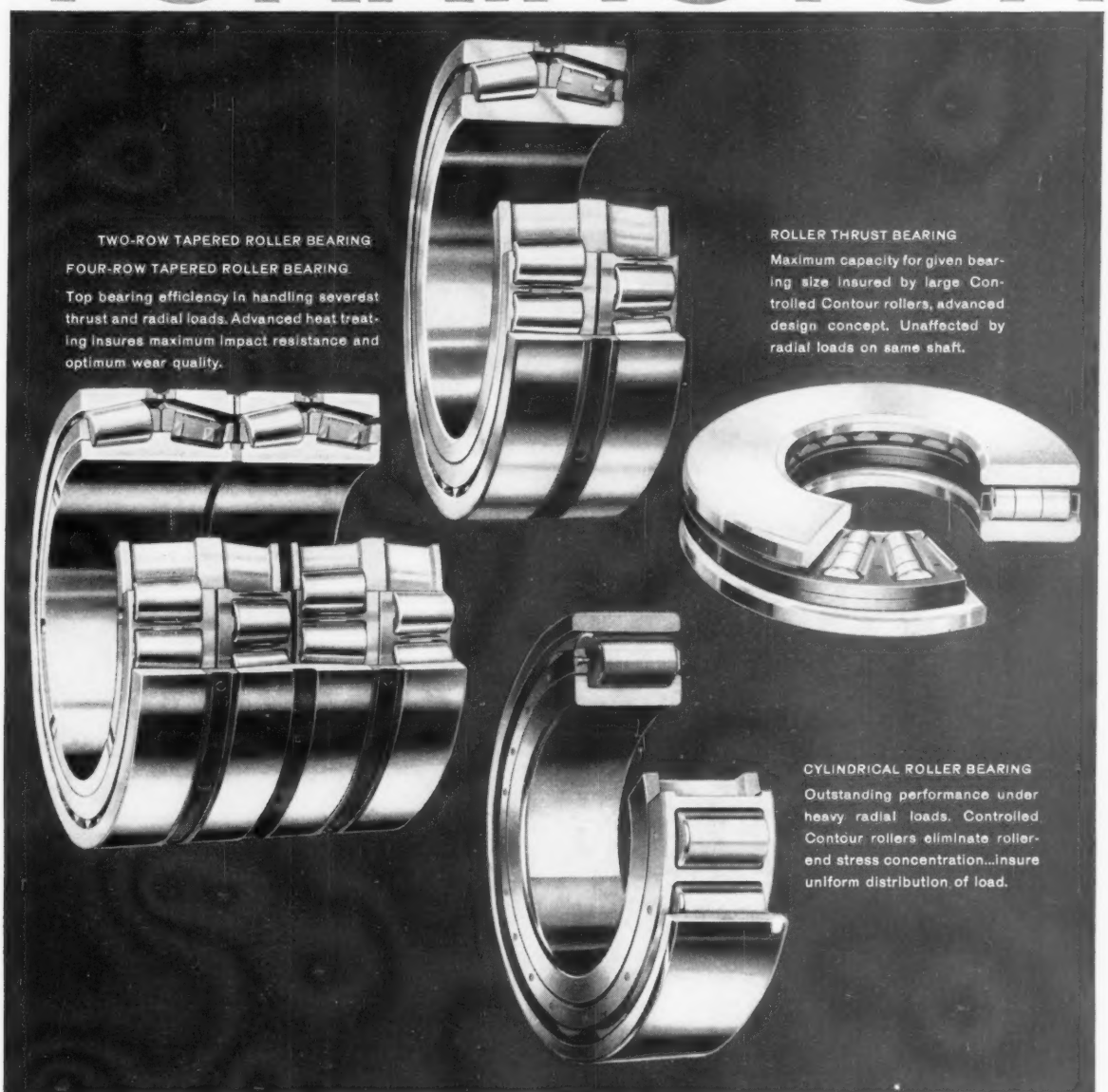
  Details on Page 95
- **PASSENGER CAR OUTPUT (UNITS)**
  - Week ended Oct. 7 . . **110,000***
  - Year ago **140,832**

  Details on Page 90
- **STEEL INGOT OUTPUT (TONS)**
  - Week ended Oct. 7 . . . **2,131***
  - Week ago 2,131

  Details on Page 186

†Preliminary. *Estimated.

TORRINGTON


TWO-ROW TAPERED ROLLER BEARING
FOUR-ROW TAPERED ROLLER BEARING
Top bearing efficiency in handling severest thrust and radial loads. Advanced heat treating insures maximum impact resistance and optimum wear quality.
ROLLER THRUST BEARING
Maximum capacity for given bearing size insured by large Controlled Contour rollers, advanced design concept. Unaffected by radial loads on same shaft.
CYLINDRICAL ROLLER BEARING
Outstanding performance under heavy radial loads. Controlled Contour rollers eliminate roller-end stress concentration...insure uniform distribution of load.

TORRINGTON PRECISION...RIGHT WHERE YOU NEED IT!

Whatever the type of Torrington bearing best suited to your needs, you can be sure of one thing...Torrington precision.

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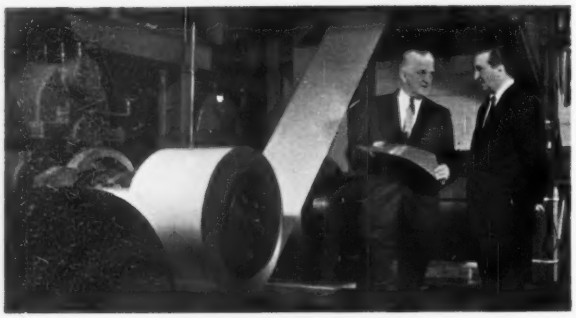
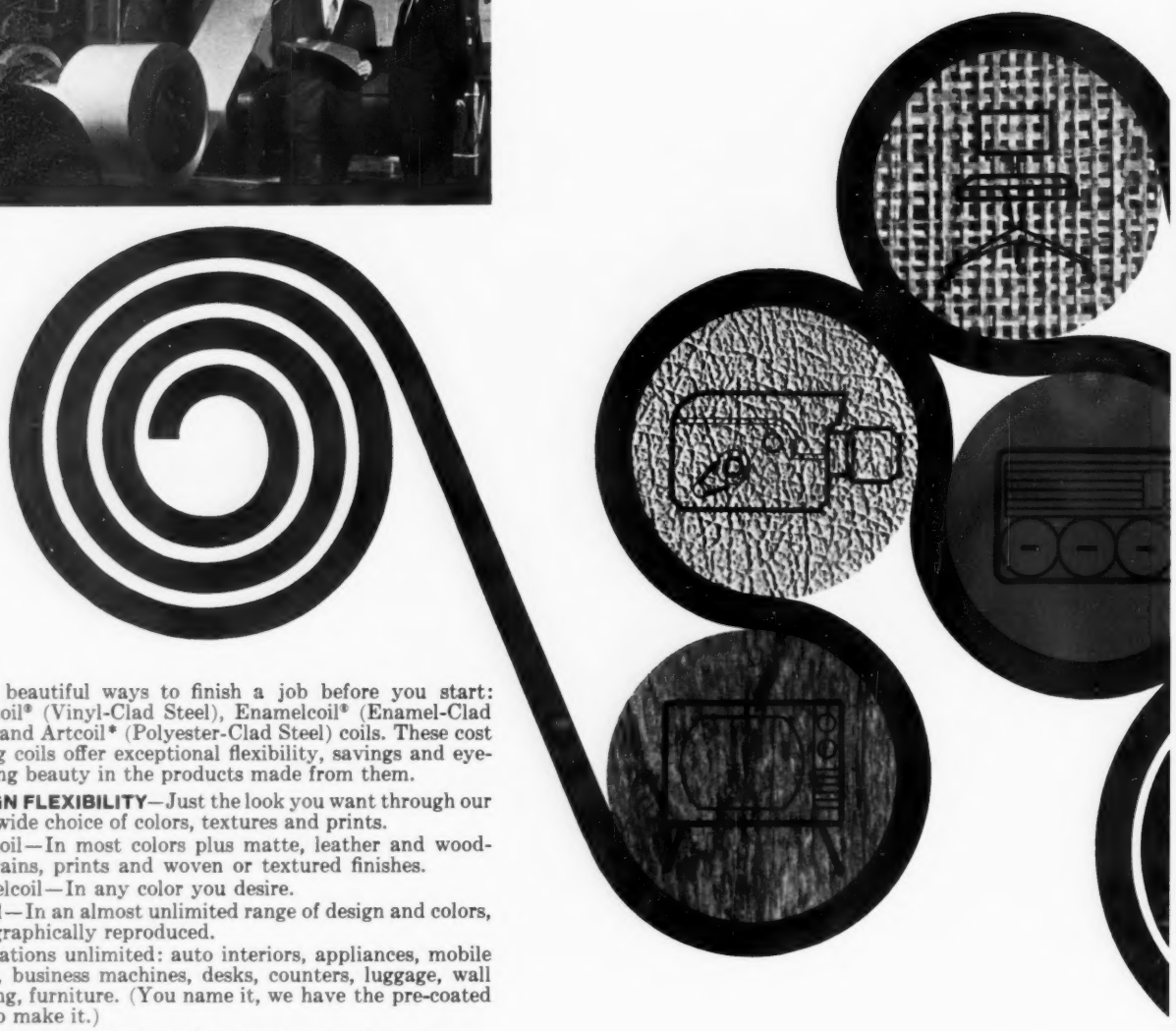
A BEAUTIFUL FINISH TO START WITH ... AND SAVE WITH:

PRE-COATED STEEL COILS FROM ENAMELSTRIP





Three beautiful ways to finish a job before you start: Vinylcoil* (Vinyl-Clad Steel), Enamelcoil* (Enamel-Clad Steel) and Artcoil* (Polyester-Clad Steel) coils. These cost cutting coils offer exceptional flexibility, savings and eye-catching beauty in the products made from them.

DESIGN FLEXIBILITY—Just the look you want through our wide, wide choice of colors, textures and prints.

Vinylcoil—In most colors plus matte, leather and wood-like grains, prints and woven or textured finishes.

Enamelcoil—In any color you desire.

Artcoil—In an almost unlimited range of design and colors, photographically reproduced.

Applications unlimited: auto interiors, appliances, mobile homes, business machines, desks, counters, luggage, wall paneling, furniture. (You name it, we have the pre-coated steel to make it.)

PRODUCTION SAVINGS—No cleaning, tumbling, spraying, dipping, rustproofing, baking or drying. Less scrap loss; reduced investment in finishing equipment, space and labor requirements; lower insurance costs; longer die life. No fabricating restrictions—you can bend, crimp, drill, pierce, emboss, deep draw, roll form or lock seam most finishes—work them to the very limits of their tough steel base without damaging their durable coatings.

SALES APPEAL—Your product has immediate customer appeal because of its finished beauty, its resistance to scratches, scuff marks, stains and corrosion.

The competitive edge is yours when you start with a beautiful finish. Specify the good looks and long life—the savings and flexibility of these modern pre-coated steel coils from Enamelstrip. Contact your nearest National Steel Sales Office for complete details.

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ENAMELSTRIP ALLENTOWN, PENNSYLVANIA

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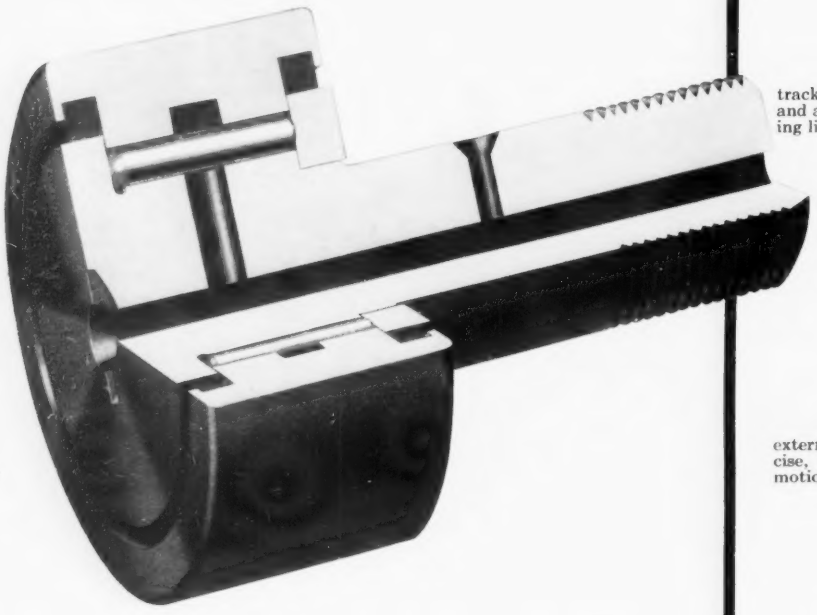
CAMROL®

BEARINGS

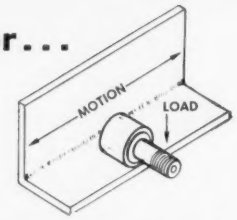
are ideal for these applications . . . outperform, last longer and cost less than improvised units



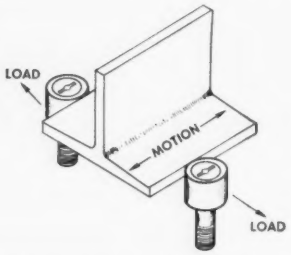
CF Series CAMROL bearings from stock eliminate the need for procurement and assembly of parts for "built-up" bolt, bearing and washer units. They also provide precision and uniformity of construction which assures accurate, trouble-free anti-friction performance. High capacity in small radial space (and the ability to withstand shock loading) are achieved through a full complement of rollers supporting a heavy outer race.

Stock sizes in roller diameters from ½" to 4" in CF series with integral stud and CYR series for shaft mounting. Available in all series with integral seals for lubricant retention and protection from contamination, and in a new heavy duty stud series.

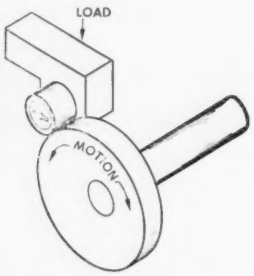
For . . .



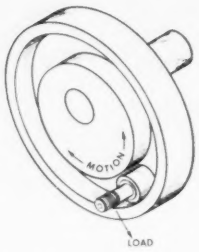
track or load support rollers to provide anti-friction linear motion



track guide rollers—to insure free and accurate lateral location during linear motion



external cam applications — precise, anti-friction translation of motion



internal cam applications

Send for Catalog No. 62 for complete information on McGill needle roller bearings.

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precision needle roller bearings

INDUSTRY'S **FIFTH COLUMN**

Tunnel vision! Restricted outlook! Tunnel vision acts as a fifth column in America's war for economic survival. It causes **management** to see only the balance sheet and ignore the pressing need to retool. It causes **labor** to picture only pay hikes without compensating productivity. It causes **government** to kill, with unrealistic depreciation allowances, the goose that lays its golden tax eggs. Tunnel vision distorts American industry. Let's open our eyes. It's later than we think.

A machine tool is only as good as the CUTTING TOOL it drives. The industrialist who "economizes" on a cutting tool defrauds himself—not only of machining accuracy but of the increased production and resulting profits which can be delivered. Pratt & Whitney Cutting Tools will bring out the best in your machine tools, will help win **your** battle for economic survival.

Pratt & Whitney

HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

machine tools / cutting tools / gages

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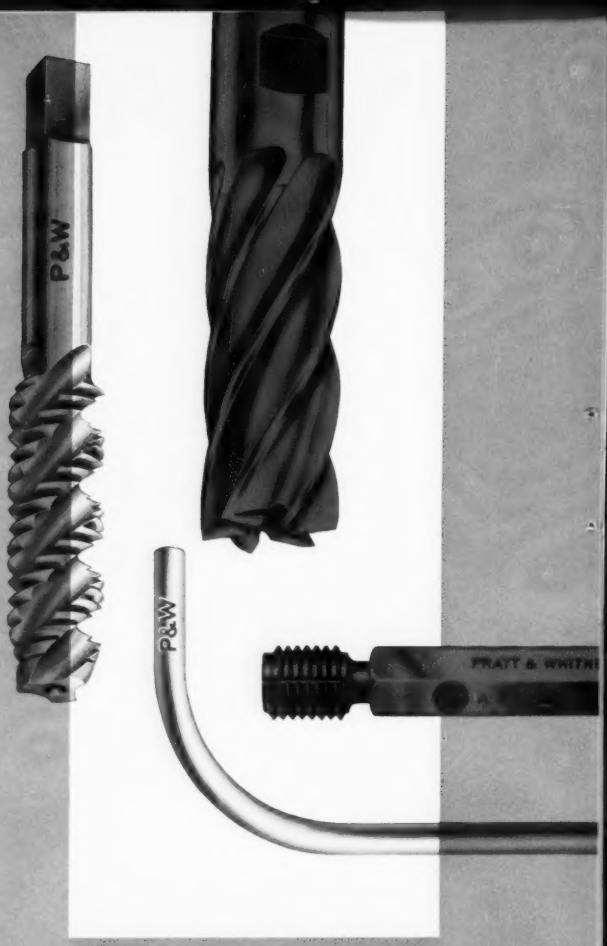
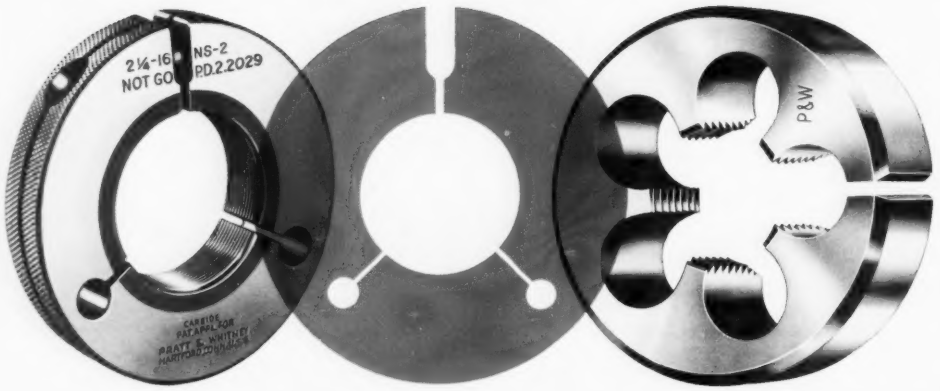


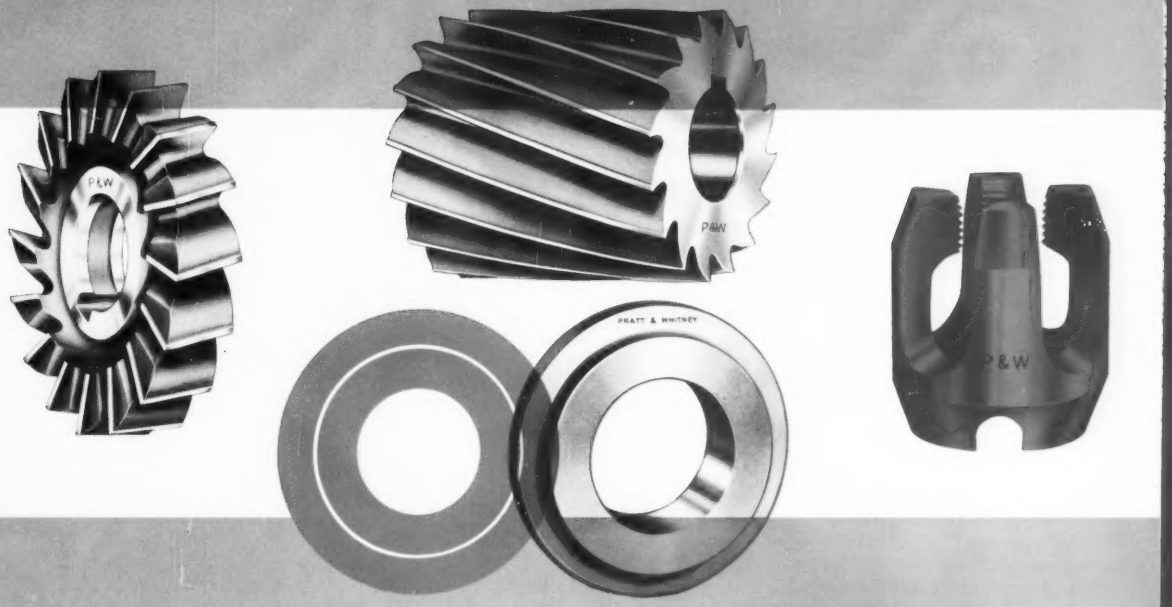
...AND SO DO OUR "PRESTIGE PARTNERS"
...OUR DISTRIBUTORS

INDUSTRIAL DISTRIBUTORS
THE RIGHT HAND OF PRODUCTION



TAPS • THREAD CUTTING DIES • MILLING CUTTERS • END MILLS • REAMERS • DRILLS • SOLID CARBIDE TOOLS • KELLERFLEX BURS

CYLINDRICAL GAGES • THREAD GAGES • SNAP GAGES • OIL COUNTRY & RAILROAD GAGES • PRECISION GAGE BLOCKS • TRI-ROLL THREAD COMPARATORS

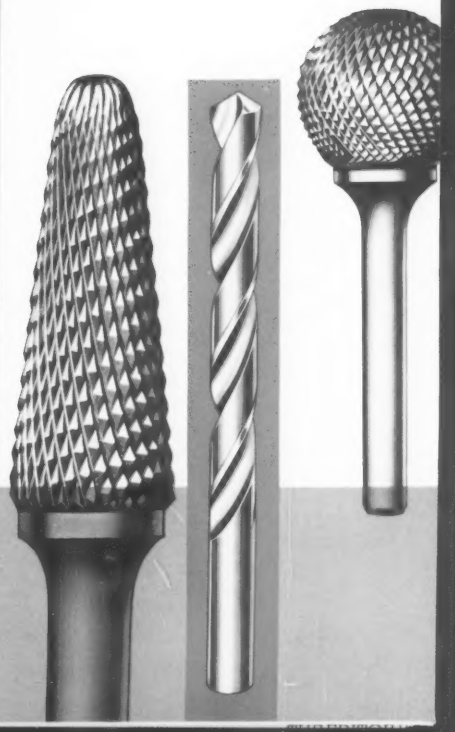


Don't Take a Chance . . . In the tough fight for customer dollars, only the efficient company wins out. In this fight, production inefficiency is a fifth column that can squeeze you out of the competitive picture. Taking a chance on your cutting tools and gages can be a costly mistake . . . can cause the production inefficiencies that seriously hurt your company. When you use Pratt & Whitney products you are putting yourself in the hands of a company that for over 100 years has helped its customers do the quality work that gets **them** more customers.

A Pratt & Whitney Exclusive . . . We offer a complete line of cutting tools and conventional gages made to the most effective designs. In addition, P&W also has an invaluable "extra" **exclusive** for a manufacturer of cutting tools and gages. We are manufacturers of machine tools as well and as a result are more aware of the role and importance of cutting tools to machine tool operation.

Coordinated Research . . . Our research laboratories are continuously running coordinated studies of machine tools, gages and cutting tools. Out of all this comes cutting tool and gage superiority—superiority proved by the longer life of these products . . . by their ability to produce more pieces.

Before Buying, Check P&W's "Prestige Partners"—Our Distributors . . . All P&W cutting tools and conventional gages are now available through selected Industrial Distributors in your area. We—and our distributors—want to sell these quality cutting tools to aggressive companies that want to keep their present customers and reach new customers. Before buying any cutting tool or gage, your shrewdest move will be to check Pratt & Whitney or your nearest P&W Distributor. It is really to your advantage to do so.



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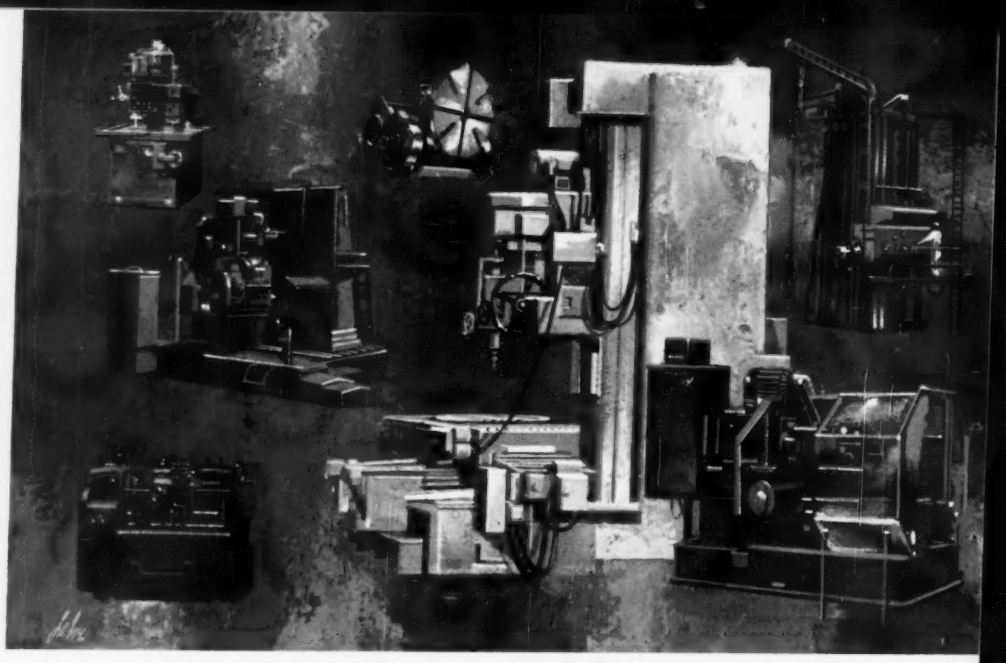
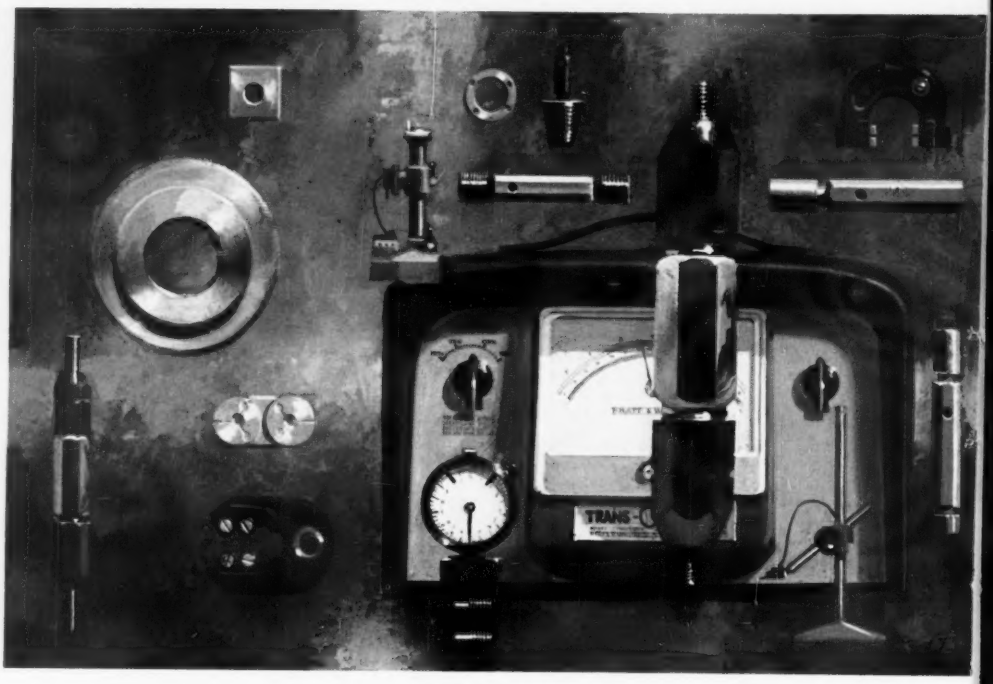
Are you producing prototypes, dies, large or small lots of production parts? Ultra-precision locating (to "tenths" accuracy)? Boring, profile milling (with or without masters)? All these and countless other problems can be solved with P&W machine tools at production line speed, efficiency and economy. Machines such as the world-famous P&W KELLER,® P&W JIG BORER, P&W ROTARY TABLE and P&W POTTER & JOHNSON AUTOMATIC TURRET LATHE are available with manual or numerical controls in a variety of models to fit your needs. P&W can also supply the MAGNETRACE PROFILER, SIM LATHE, INNOCENTI-MITSUBISHI MILL and the DIAFORM WHEEL FORMING ATTACHMENT...high grade performers all. For more information ask your P&W representative.



IN YOUR FIGHT TO SURVIVE YOU NEED THE FINEST WEAPONS

P&W GAGES

More than ever, production efficiency depends on fast, precise, economical gaging. P&W supplies all types of gaging equipment. Thus, you can choose those that do your job at lowest cost... from simple CONVENTIONAL GAGES to the most intricate tape-controlled INSTRUMENT GAGES. Types include PLUG, RING, THREAD and SNAP GAGES, INTERNAL and EXTERNAL COMPARATORS, and PRECISION GAGE BLOCKS... all available through selected Industrial Distributors. The exclusive series of AIR-O-LIMIT,® TRANS-O-LIMIT® and DATA-LIMIT® gages and famous "FLYING MIKE" CONTINUOUS GAGE are available from your P&W representative. Bring your gaging problems to him.



MACHINE TOOLS – CUTTING TOOLS – GAGES • HEADQUARTERS FOR AMERICA'S WAR AGAINST OBSOLESCENCE

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PRATT & WHITNEY COMPANY, INCORPORATED, CHARTER OAK BOULEVARD, WEST HARTFORD, CONNECTICUT

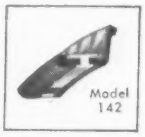
ENGINEERED OIL SEALS
for Steel Mills

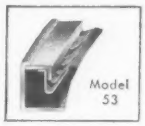
Garlock KLOZURE* Oil Seals (left) help keep lubrication in, dirt out of roll neck bearing at Inland Steel's East Chicago mill.

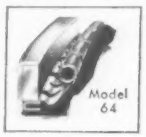
Inland Steel applies Garlock KLOZURE Oil Seals for protection of mill roll neck bearings at East Chicago.

Minimizing lubrication leakage from the inboard and outboard ends of the bearings, Garlock KLOZURE Oil Seals provide more constant service as the rolls change position in a lateral movement during operation. Inland finds, too, that in atmospheres of dirt, scale and spray, KLOZURE Oil Seals help keep foreign particles from entering—and damaging—the bearings.

For good, economical bearing protection, Inland joins the growing list of steel producers who use Garlock KLOZURE Oil Seals. Wherever you look in mills, you'll find a specific type of KLOZURE Oil Seals doing a specific job. Model 142, for instance, helps keep water splash and scale out of bearings at the shoulder of mill rolls. Models 64 and 82 protect bearings on back-up and work rolls. Model 53 is recommended for table rolls at normal and high speeds. Model 23 Split KLOZURE is ideal where equipment cannot be dismantled too easily.







Designed for peak efficiency and durability, Garlock KLOZURE Oil Seals resist oil and grease, are impervious to water, mild acids, alkalies, withstand temperatures from −40°F to +250°F. For extreme conditions, Garlock furnishes sealing elements resistant to practically any fluid, and serviceable as high as +500°F.

If you have a particular sealing problem, why not discuss it with your Garlock representative. He's backed by over 70 years of experience in engineering, production and application. Call him at the nearest of the 26 Garlock sales

GARLOCK

offices and warehouses throughout the U. S. and Canada. Or, write for Catalog AD-181, Garlock Inc., Palmyra, New York.

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Order from the Garlock 2,000 . . . two thousand different styles of Packings, Gaskets, Seals, Molded and Extruded Rubber, Plastic Products.

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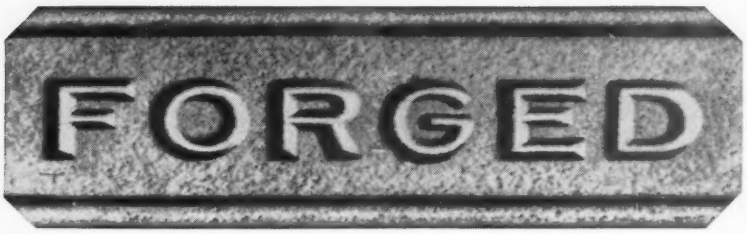

TO PUT MUSCLES INTO PARTS THAT MUST PERFORM

With the spotlight on reliability, *better make it forged* is an idea that merits serious consideration.

Forged parts offer the highest possible strength to weight ratios. They provide greater ductility, soundness, and fatigue resistance. And, forging assures superior part-to-part uniformity — in physical and mechanical properties, grain size, dimensions, and surface.

The truck transmission gear forging at left is an outstanding example of metalworking by the forging process to take advantage of the inherent directional properties of forged steel. Upset forged by Transue & Williams Steel Forging Corporation, Alliance, Ohio, the part has been cross sectioned and etched to reveal grain flow.

In forging, only quality controlled bar or ingot stock is used. Forging (or combination forging and extrusion) achieves grain refinement that produces the best possible material for response to heat treatment. In addition, die design is engineered to orient grain flow in the direction requiring maximum strength.

Republic Steel, the nation's largest producer of forging quality steels, offers a complete range of bar sizes, shapes, and materials. Teams composed of mill, field, and laboratory metallurgists can help you select and apply the most economical carbon, alloy, stainless steel, or titanium capable of meeting your requirements.

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Reliance develops first line of solid state regulators for variable speed drives

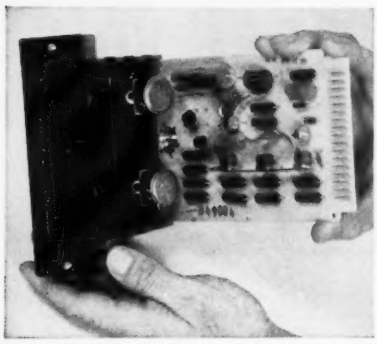
. . . gives you better circuits, precise control, less maintenance.

Reliance has produced the first complete line of solid state regulators and exciters for variable speed (V*S) drives and Engineered Drive Systems. These new devices, using power silicon rectifiers and diodes in place of tubes, achieve precise motor control, 1/10% regulation at base speed, with response times up to twice as fast as tube-type regulators. Here is a major advance in variable speed control, and a major advantage for the industrial user. Reliance Drives with these new regulators are now available to you in 1 to 1500 horsepower.

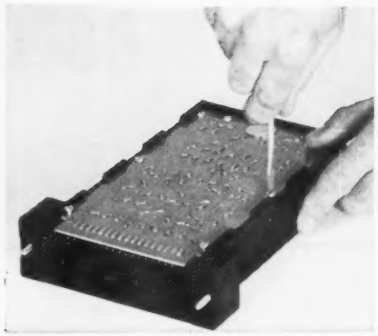
Reliance research and development brings you a more efficient drive than ever before . . . and a notable refinement of already well-engineered systems.

The pictures on the facing page tell the story.

RELIANCE . . . builders of the tools of automation

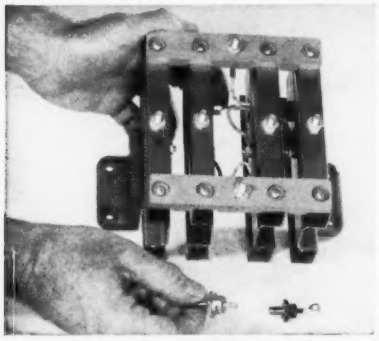


1. Heart of the system is new "Cardpak" control circuit, with transistors, capacitors and resistors to amplify feed-back signals.

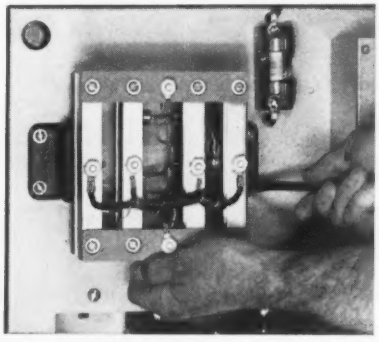


2. Each plug-in "Cardpak" module is a complete control circuit...can be quickly checked and easily replaced, if ever necessary.

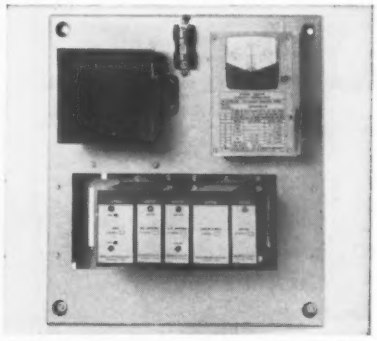
3. Each V★S Drive control system is tailored to your specific job . . . with "Cardpak" circuits pre-engineered for reliability, fast delivery.



4. Power silicon controlled rectifiers and diodes, instead of tubes, are among the most reliable components yet devised.

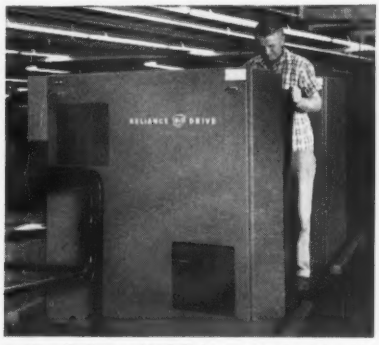


5. The rectifiers, mounted on copper plates for heat radiation, operate over a wide temperature range with no special cooling.



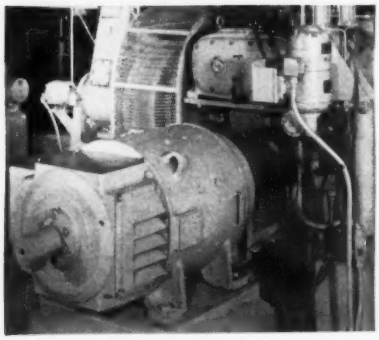
6. Complete panel can be checked quickly for start-up and trouble shooting with the optional test fixture . . . one meter, one knob.

7. Motor control is precise . . . 1/10% regulation at base speed, with response times up to twice as fast as tube type regulators.



8. The Reliance V★S Drive control cabinet is 35% smaller than conventional drives. Cabinet can be located where convenient.

9. Operator's station centralizes drive operation. Multiple stations, bench boards, pendent stations and special controls available.



10. The Super-T D-c. Motor . . . integral part of the V★S Drive. It's rugged . . . absorbs repeated 100% overloads for one full minute.

Your nearest Reliance Systems Engineer will give you all the facts . . . help you apply Reliance V★S Drives to your products and processes. Call him through the Yellow Pages, or write us direct.

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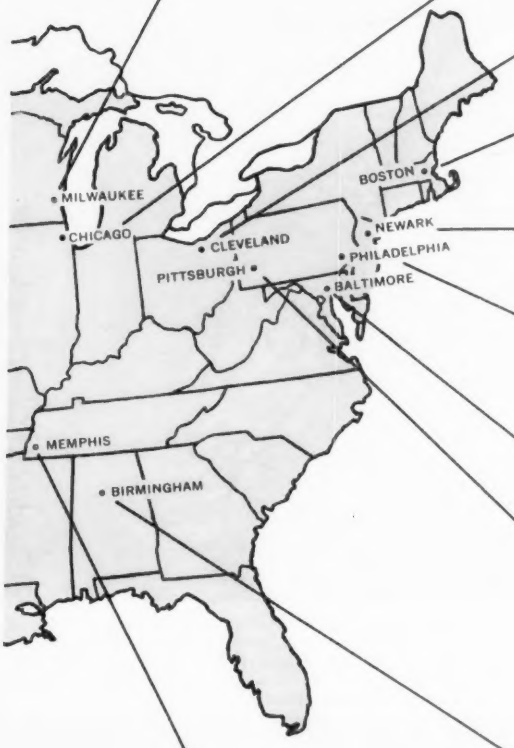

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DISTRICT MANAGER

United States Steel Supply
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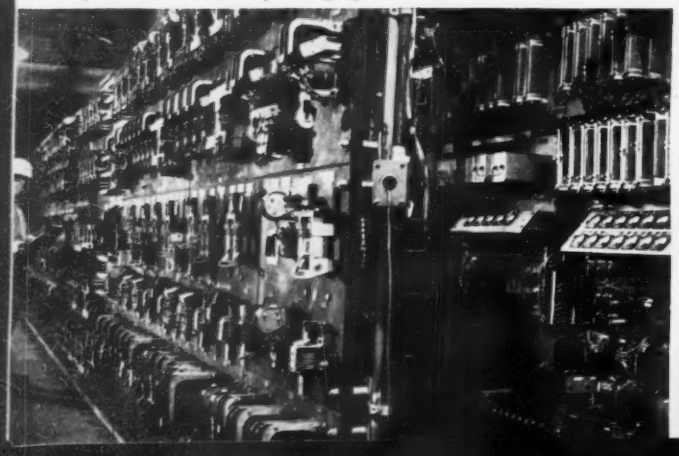
United States Steel

Pittsburgh Service Center FA 2-4200

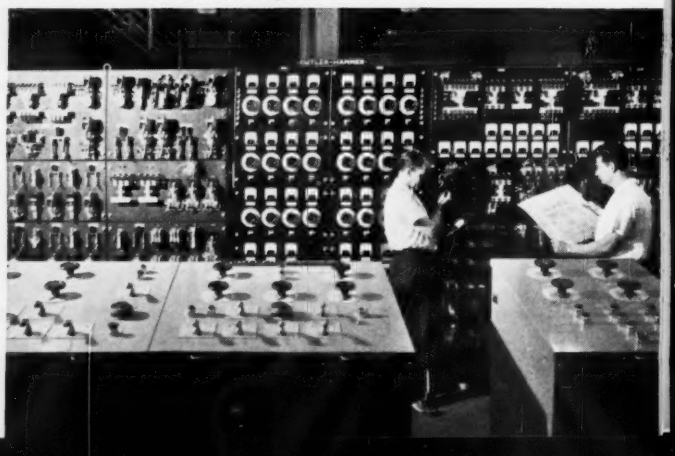
EARL L. SIMANEK
DISTRICT MANAGER

United States Steel Supply
Division of
United States Steel

Cutler-Hammer Control. Shown here, the control of 87 D.C. motors, employing 16 static regulators. Kaiser annealing line control system also regulates 45 A.C. auxiliary motors; requires 10 operators' stations and more than 300 meters, pushbuttons, master switches, potentiometers and operating lights.



Cutler-Hammer Test Floor. Here, complete factory tests of systems control prior to shipment insure faster installation, more trouble-free start-ups. Analog computer-simulator can test engineering solutions before construction; simulate response of any motor or machine to aid in actual factory tests.



What's new in systems control?

Cutler-Hammer Control commands 1600 h.p. High Speed Annealing line at Kaiser Fontana

Big D-c system meets demanding requirements on 1200-FPM line

The responsibility for making the block-long system of huge equipment in a modern annealing line function continuously and in perfect step falls on control engineering. For this responsibility, including all control and rotating equipment, Kaiser selected Cutler-Hammer in the recent expansion of its Fontana works.

The problem: a continuous flow of steel strip through entry, furnace and recoil sections . . . through looping towers on each side of the furnace . . . at 1200 to 1500 FPM!

Laboratory testing speeds trouble-free start-up

Each step posed a critical control problem. Yet Cutler-Hammer's systems and control engineers bound the whole into a smoothly operating team. The entire system was pre-tested in Cutler-Hammer laboratories. Result: Kaiser-Fontana reaped the benefits of a more complete test, quicker installation, and a faster, more trouble-free start-up. Kaiser today produces the uniform quality tinplate demanded by its customers.

Cutler-Hammer control systems and equipment were installed on seven of the first nine high-speed annealing lines built. Cutler-Hammer engineering and equipment is also at work on the Fontana pickling line, coil preparation line, and in auxiliaries for slabbing, hot strip and temper mills.

Call the C-H man . . . early!

Cutler-Hammer's broad experience in all phases of systems control design means the Cutler-Hammer man brings a knowledgeable eye to your particular control problem. Cutler-Hammer procedures insure a complete pre-test of your system. Assure you a quicker installation and a faster, trouble-free start-up. Call your nearby Cutler-Hammer office early.

WHAT'S NEW? ***ASK...***

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

CF&I Shaped Coils and Stem-Paks® are Packaged for Your Production

SHAPED COILS

Here's a quote from one satisfied user, the president of a wire fabricating plant:

> "A CF&I salesman examined our operation and suggested that we use CF&I Shaped Coils as opposed to the small coils we had previously used. We now stop our machine only once to start a new coil, instead of 10 times a day. We save nearly 2 hours, and have increased our production by about 20%."

CF&I-Wickwire Shaped Coils contain between 1500 and 2500 lbs. of top quality wire in one continuous length . . . are bundled with four steel straps and, when necessary, wooden supports to insure that the coil is not distorted.

OPERATING ADVANTAGES: Increased production, reduced material-handling costs, less wire scrap and less storage space needed.

DISPOSABLE STEM-PAKS

The experience of a typical user:

> "Up to 75% of our production downtime was caused by using too many small coils. Stem-Paks hold 500 to 1000 pounds of continuous wire. These larger packages keep each machine running as much as 1½ hours longer per day. Stem-Paks allow for free unwinding, without snarling. CF&I Stem-Paks have increased our production 50%."

Stem-Paks hold 500-1000 lbs. of wire in one continuous

length . . . consist of a center core attached to a wooden base mounted on 4″ runners.

AVAILABLE IN: Sizes for 14″, 17″ and 21″ center core (inside diameter).

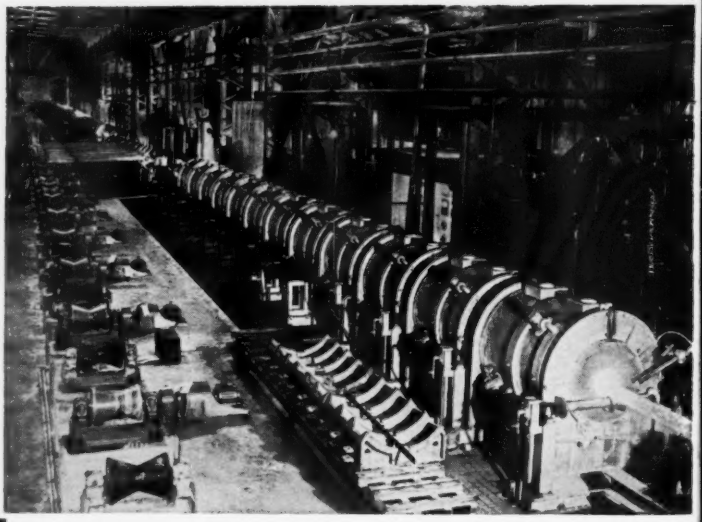
OPERATING ADVANTAGES: Ease of handling, reduced scrap losses, increased production and less storage space.

Only CF&I offers a total of ten different wire packages. You've just read how two of these packages have increased the production efficiency of leading manufacturers. One or more CF&I-Wickwire Wire packages can do the same for you. Our engineering staff will be happy to study your operation and recommend the type that best meets your requirements. For complete details, write your local CF&I sales office.

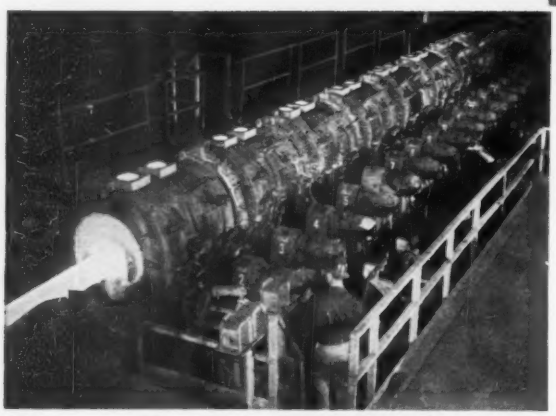
THE COLORADO FUEL AND IRON CORPORATION
Denver • Oakland • New York
Sales Offices in Key Cities 6114

NEW SLANTS ON HEAT PROCESSING FROM SELAS

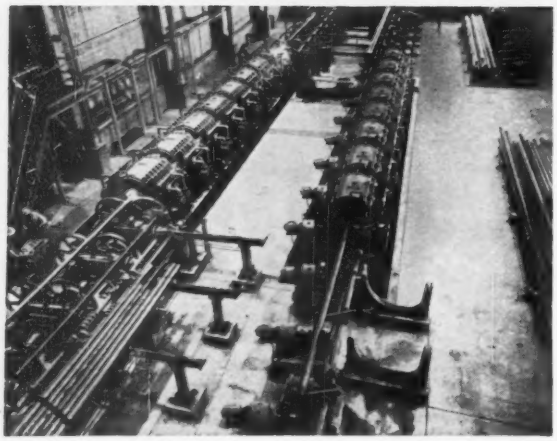
Here's how the Steel Industry relies



TUBING... *is normalized and, if required, stretch-reduced in this Selas barrel-furnace line. After forming and welding, the tubing is conveyed through a 48-barrel normalizing line with exit temperature approximately 1650° F. Stretch-mill product proceeds through 12 additional* GRADIATION® *furnaces which heat tubing to 1800°-1850° F. Entire process is automated, with line speeds matching mill speeds.*



BLOOM REHEATING *"on the fly," at rates of 198 tons per hour is accomplished in this continuous Selas barrel-furnace line. Reheating time of* only 3 minutes *reduces scale, amounting to a saving of 3 tons of steel per hour. Automated handling saved enough to pay for equipment in first 1½ months! Occupying floor area only 63' x 11', this continuous furnace assures uniform rolling temperature within each bloom and from piece to piece.*



SHORT-CYCLE HEATING *of seamless tubing for oil-country application is a typical cost-saving operation for Selas barrel-furnace lines. This overall view shows hardening (left) and tempering (right) lines, with automatic transfer between these treatments. Eight barrels per line. Advantages include: uniform properties throughout, negligible scale, reduced floor space requirements, and high degree of controllability.*

on Selas barrel-furnace lines

The installations on these pages graphically demonstrate how the steel industry relies on Selas barrel-furnaces to

- cut operating costs
- increase production rates
- reduce handling and labor requirements
- save valuable floor space
- improve product quality

Specifically designed and custom-built to meet individual production requirements and job specifications, Selas barrel-furnace lines employ time-proven standardized engineering features for long-time operating dependability and minimum initial investment. Acceptance? 446 Selas barrel-furnaces are at work in 49 separate heat treating lines for a variety of continuous applications including annealing stainless bars and tubing, heating billets for piercing, reheating pierced tubes for sizing, hardening and tempering oil country alloy and carbon tubing, etc. What's more, 96 additional units are now in various stages of construction.

At your convenience . . . without cost or obligation to you . . . a Selas field engineer would welcome the opportunity to survey your needs. For this personal service contact our Furnace Steel Mill Division, Dresher.

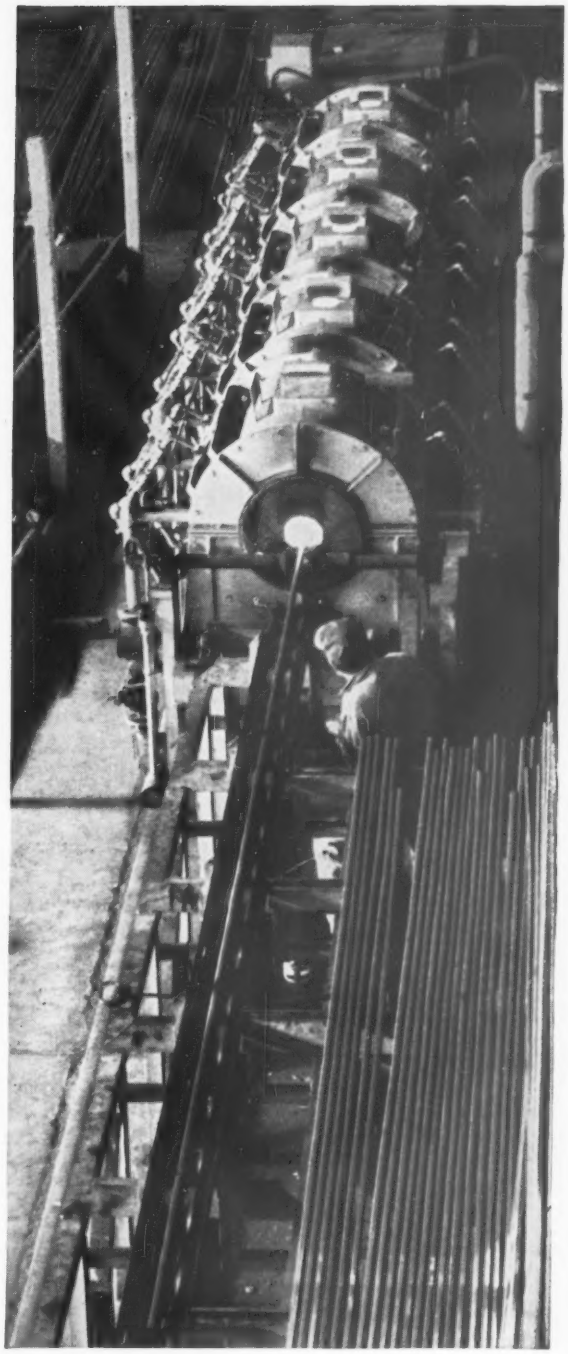
SELAS CORPORATION OF AMERICA
210 Dreshertown Road, Dresher, Pa.

EUROPEAN SUBSIDIARY: Selas Corporation of America, European Div., S.A., Pregny, Geneva, Switzerland. **INTERNATIONAL AFFILIATES:** AUSTRALIA—Major Furnace and Combustion Engineers Pty, Ltd., Melbourne; FRANCE—Societe Exploitation de Produits Industriels, Paris; JAPAN—International Machine Co., Ltd., Tokyo.

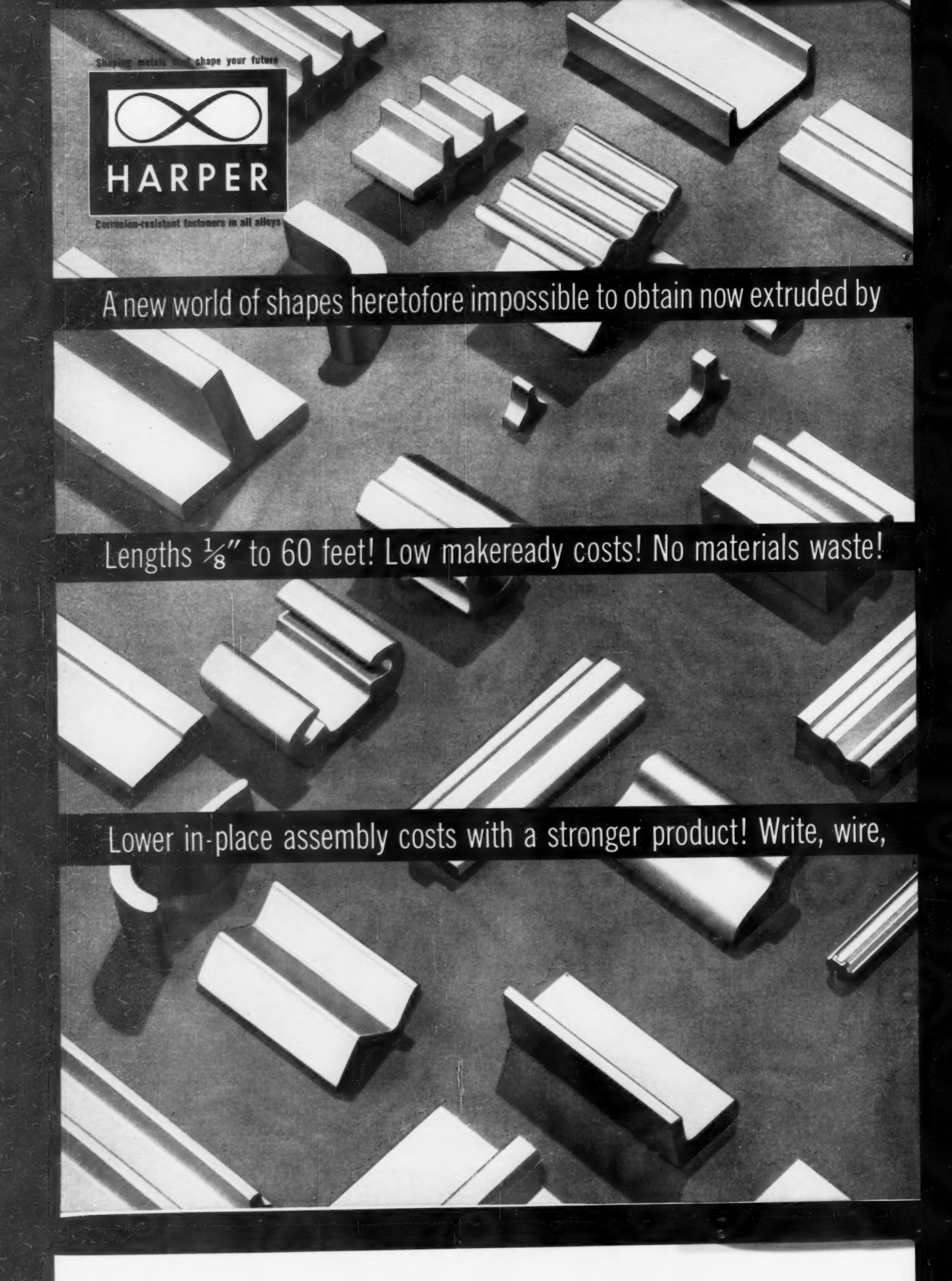
GRADIATION and DURADIANT are registered trademarks of Selas Corporation of America.

SELAS

HEAT AND FLUID PROCESSING ENGINEERS
DEVELOPMENT / DESIGN / CONSTRUCTION



STAINLESS STEEL *bars up to 5¼" cross-section and lengths to 30' are continuously annealed, and other grades normalized in this compact line of barrel-type furnaces.* DURADIANT® *burners heat uniformly at high thermal gradient without flame impingement on the work, resulting in minimum oxide formation. Annular ring water-spray quench cools work quickly and uniformly for maximum straightness in the annealed product.*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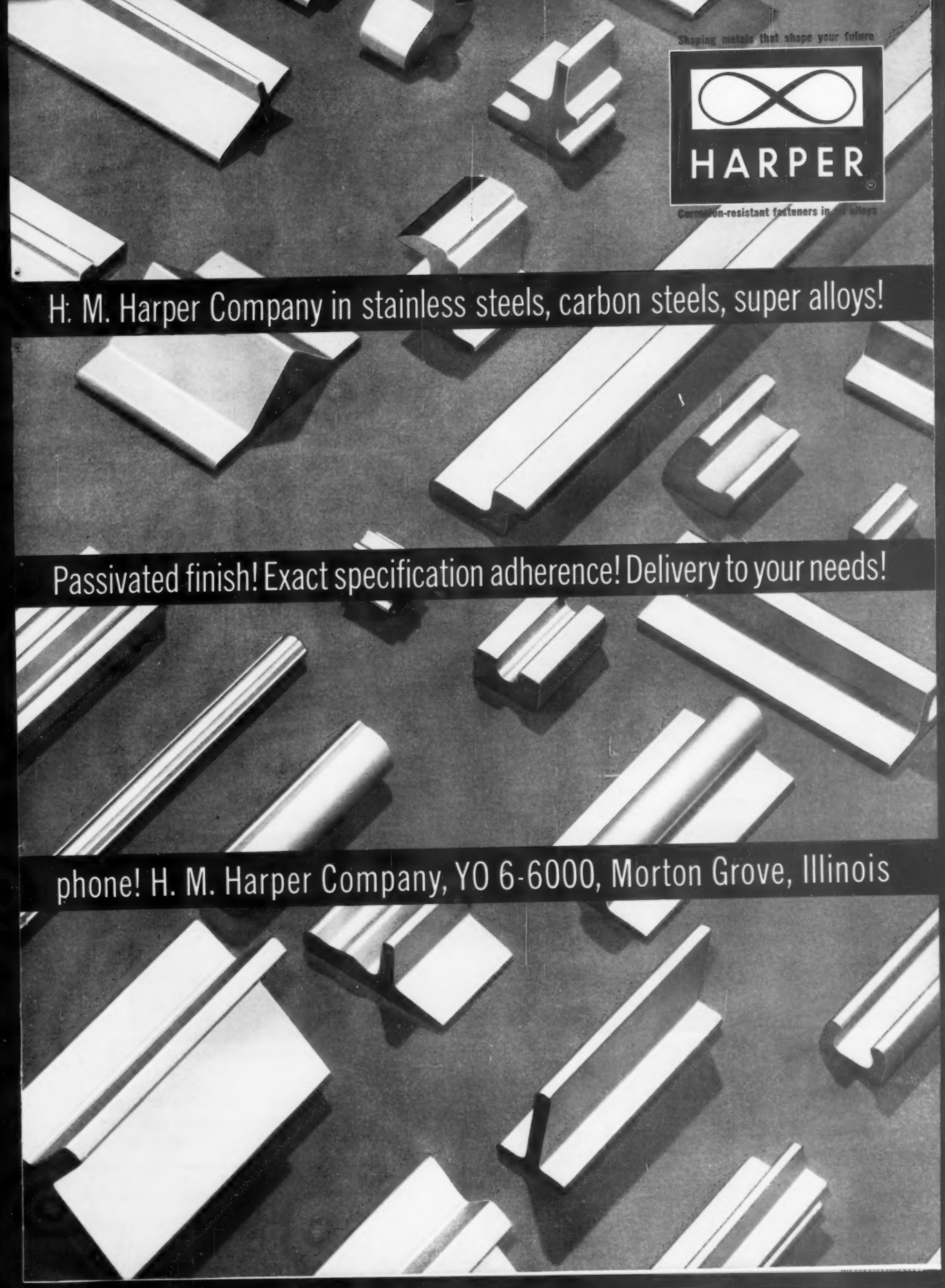
HARPER
Corrosion-resistant fasteners in all alloys
A new world of shapes heretofore impossible to obtain now extruded by
Lengths 1/8" to 60 feet! Low makeready costs! No materials waste!
Lower in-place assembly costs with a stronger product! Write, wire,


Shaping metals that shape your future
HARPER
Corrosion-resistant fasteners in
H. M. Harper Company in stainless steels, carbon steels, super alloys!
Passivated finish! Exact specification adherence! Delivery to your needs!
phone! H. M. Harper Company, YO 6-6000, Morton Grove, Illinois

General Electric Makes Eddy-current-coupling Drives

And they're dependable drives. The complete line includes water-cooled and air-cooled eddy-current couplings. We call them KINATROL* drives. Ratings are from 1 to 150 horsepower, operating from standard a-c power.

A General Electric KINATROL drive is not just another eddy-current coupling. For instance, in the water-cooled coupling, water control is packaged. You'll see much less external piping. Furthermore, the coupling is protected from flooding—and the air gaps are dry, preventing corrosion.

KINATROL couplings are compact, field proven and dependable. General Electric has had a good deal of experience in the engineering, manufacturing, and application of packaged adjustable-speed drives. And we know how important service is to a customer.

KINATROL —a good product, with the kind of service you can depend on. Please call your nearest General Electric Sales Office for further details.

*Trademark of General Electric Company

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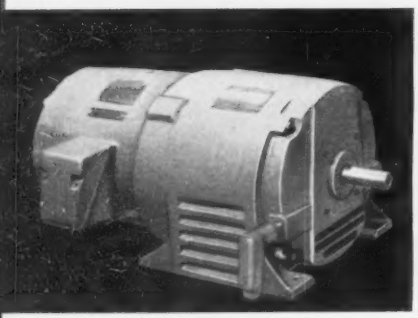
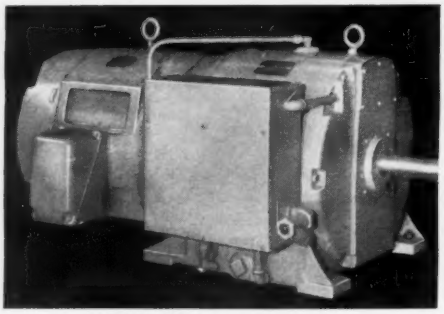
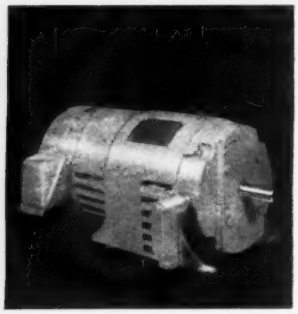


AIR COOLED, 7-1/2 to 100 HP



WATER COOLED, 25 to 150 HP

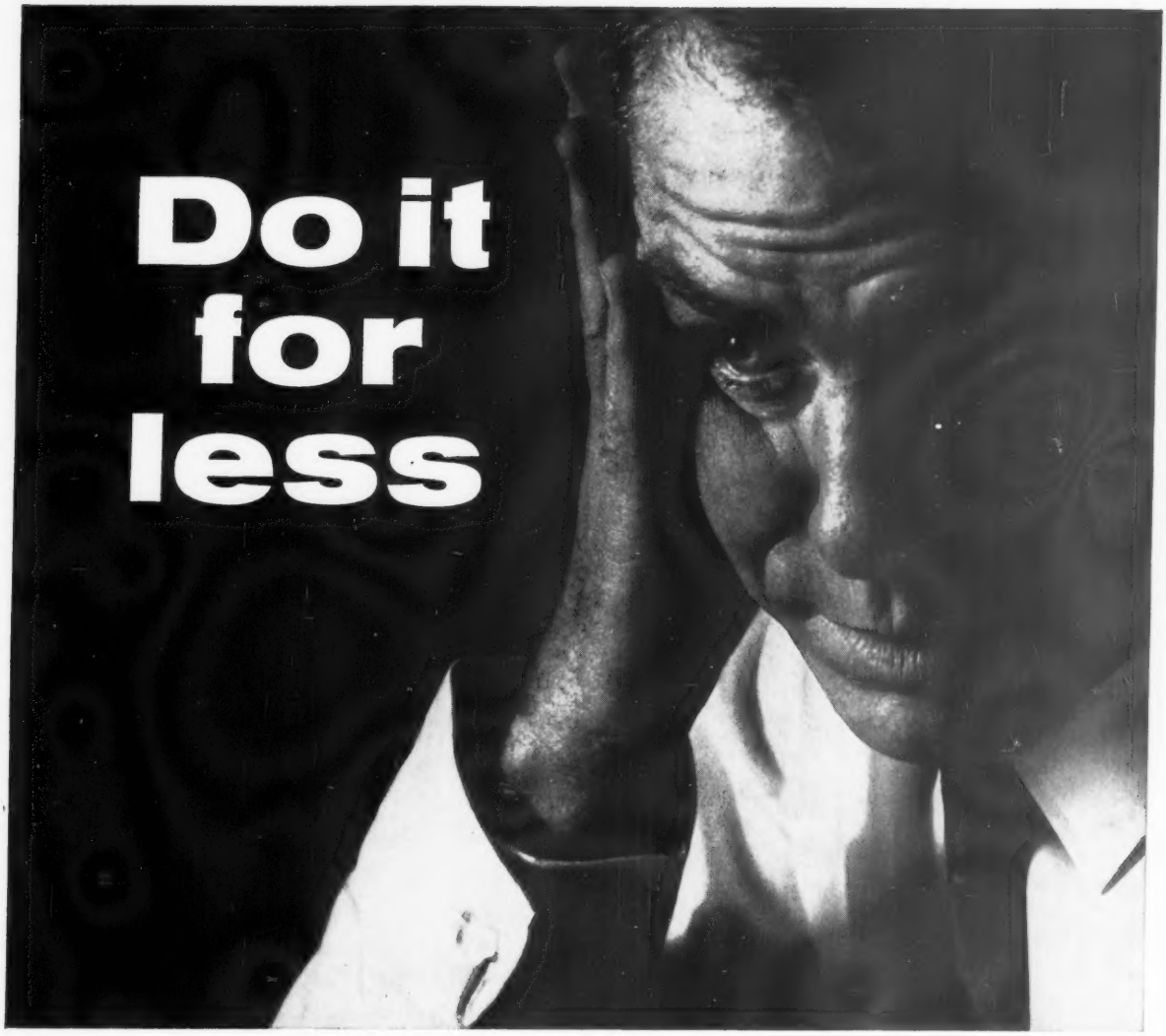


AIR COOLED, 1 to 5 HP

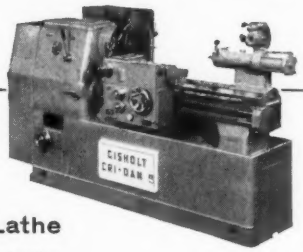
DIRECT CURRENT MOTOR AND GENERATOR DEPARTMENT

GENERAL ELECTRIC

ERIE, PENNSYLVANIA



ON A CRI-DAN AUTOMATIC THREADING LATHE



Gisholt CRI-DAN Model B Automatic Threading Lathe

Sets up in 8-15 minutes.

Inexpensive single-point carbide tools produce all types of internal and external threads: Single- or multiple-start, Coarse or fine, Left- or right-hand, Straight or tapered, Standard or special form—in any material, including new high-tensile, hard alloys.

Call your Gisholt Representative or write for Catalog 1215.

Can you afford to stay with conventional threading methods and pass up savings of 30% to 80%?

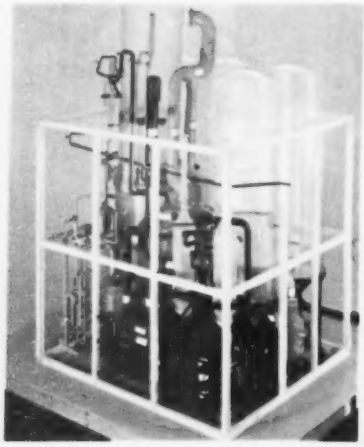
These savings can be yours with a Gisholt CRI-DAN High Speed Threading Lathe. Times are drastically reduced. You use single-point carbide tools. Quality threads—simple or complex—are produced automatically.

Whether you're threading in lots of 6 or 600, the CRI-DAN method will do it for less.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin, U.S.A.

Turret Lathes • Automatic Lathes • Balancers • Superfinishers • Threading Lathes • Factory-Rebuilt Machines with New-Machine Guarantee

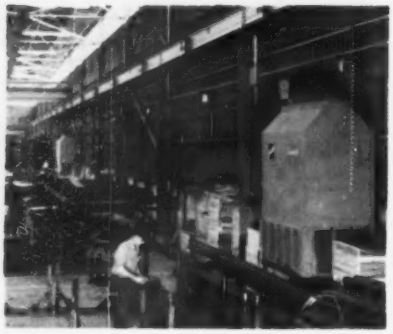
Reduces, Separates, Transports,



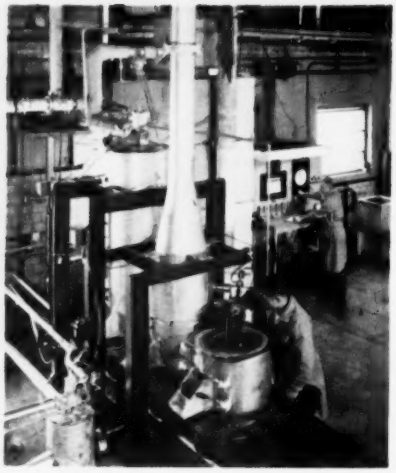
SEPARATES: Engineering model of cold box for a Dravo-Linde AG air separation plant. Highly efficient, these units produce oxygen at low cost. Dravo turn-key construction services also include power and steam plants, water pumping and treatment systems, piping, other plant installations. Check coupon for details.

TRANSPORTS: Union Barge Line, Dravo subsidiary, offers common carrier and contract transportation service to all points on the Mississippi River System and Gulf Intracoastal Waterway. Modern equipment, regularly scheduled sailings assure economical and reliable deliveries. For details, check and mail the coupon.

HANDLES: This giant multi-purpose dock handles incoming raw materials and outgoing products for major steel producer. Dravo pioneered cellular dock construction and has built them of all sizes for virtually every industry. For information on docks and Dravo bulk materials handling equipment, mail the coupon below.



HEATS: Eleven Dravo space heaters provide low-cost comfort heating in this fabricating plant. Over 20,000 units (250,000 to 2,500,000 btu) have been installed in many different types of buildings of all sizes. Check, mail coupon for information.



AGGLOMERATES: At Dravo Research Center, continuing studies are conducted to improve pelletizing, briquetting and sintering processes and plant design. For details on agglomeration or beneficiation processes, check and mail the coupon.

REDUCES: Stora-Kaldo basic oxygen steelmaking process offers high metallurgical control, heat economy and yield. Dravo designs and builds these plants in the U.S.A. and Canada.

Dravo Corporation, 4800 Grand Avenue, Pittsburgh 25, Pa.

Please send me information on the following products and services:

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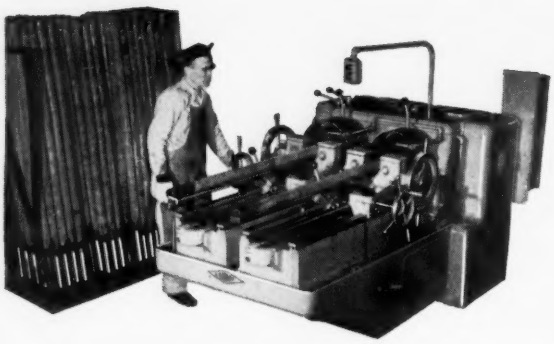
DRAVO

Handles, Heats, Agglomerates



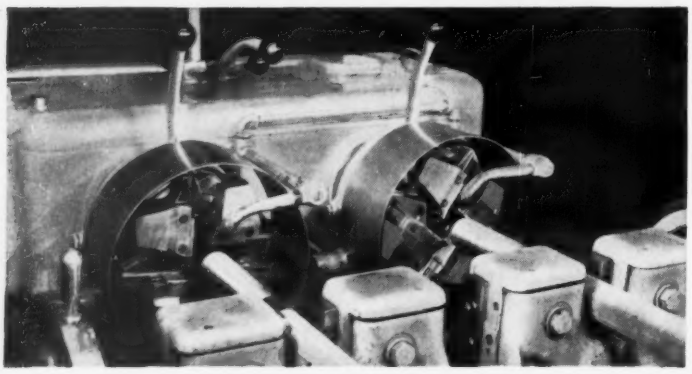
One pass heavy duty threading with

LANDMACO MACHINE

LANDMACO Threading Machines are ideal for cutting coarse pitch threads in one pass. We illustrate here the excellent results obtained by using a 2½" 20C LANDMACO Double Spindle Threading Machine at Waco Manufacturing Company, Cleveland, Ohio.

Equipped with a 2½" Type R LANCO Heat Treated Die Head, the LANDMACO cuts 2⅜", 4-Pitch Modified Acme threads on Black Pipe 8½" long at a cutting speed of 34 R.P.M. 31 pieces are threaded per hour per each spindle. Despite the large amount of metal removal, chaser life is good with 248 pieces produced between grinds for each spindle, equal to 8 hours operation.

The LANDMACO features heavy construction, hardened-and-ground ways and lead screw attachment. It may be used with either Heat-Treated or Hardened-and-Ground LANCO Die Heads. Various models of LANDMACO Machines are available to cover all diametrical ranges from ¼" to 6⅝" Send specifications when writing.

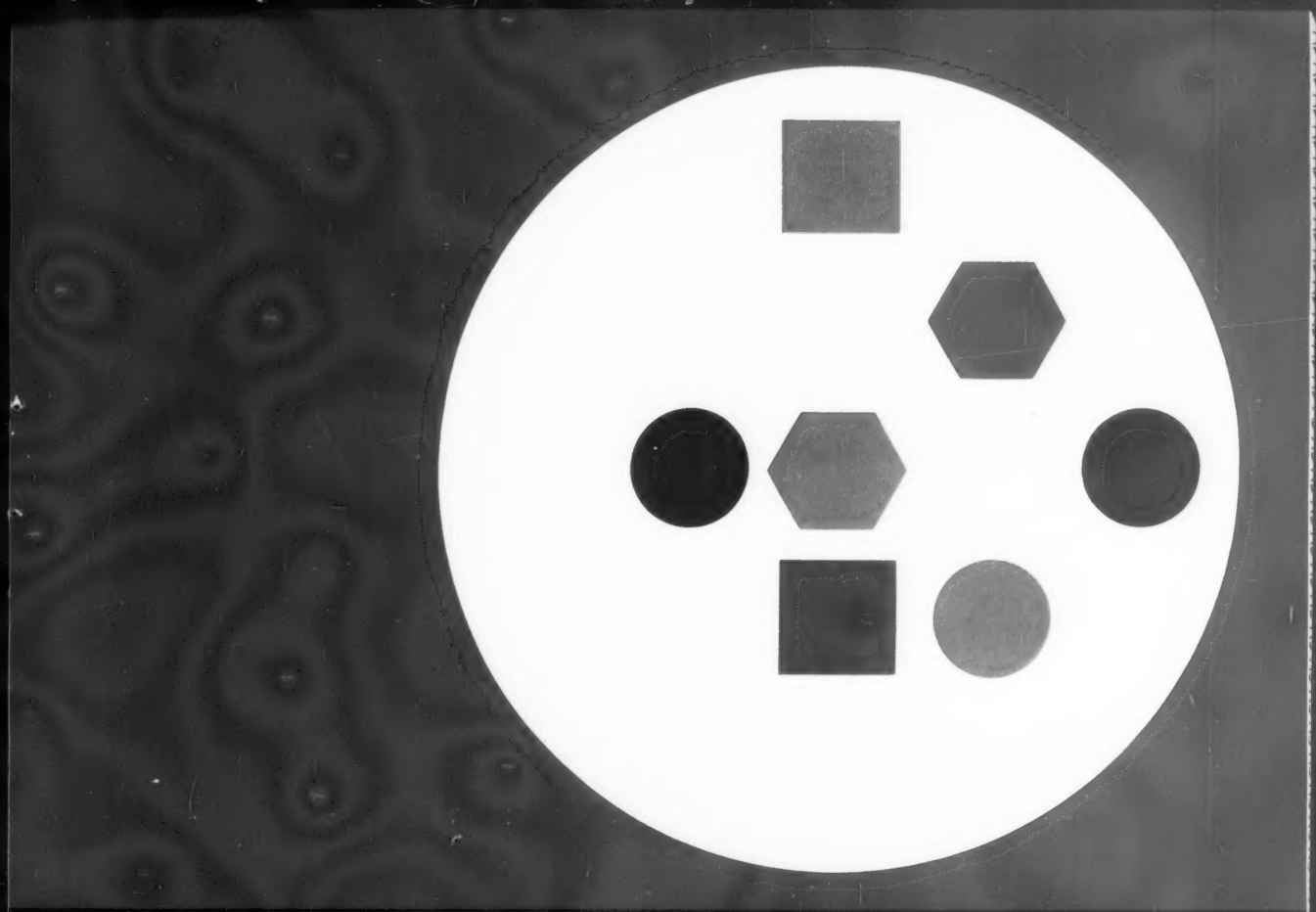


614

LANDIS *Machine* COMPANY

WAYNESBORO • PENNSYLVANIA

The world's largest manufacturer of threading equipment



Widest Range from Any Distributor Source. Calling on your local Alcoa distributor for aluminum in all its forms is like having an Alcoa plant next door. Nobody else stocks as much sheet and plate; wire, rod and bar; tube and pipe; and extruded shapes in as many sizes, alloys and finishes. Nobody else can respond as quickly to your call for metal or technical advice.

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(Waverly 6-6000)
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Brace-Mueller-Huntley, Inc.
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Buffalo 7
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(Stilwell 6-7737)
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Strahs Aluminum Company, Inc.
(Browning 2-7000)
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Whitehead Metals, Inc.
(Watkins 4-1500)
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Syracuse 1
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Greensboro
Edgcomb Steel Company
(Broadway 5-8421)
OHIO
Cincinnati 14
Central Steel and Wire Company
(Avon 1-2230)
Cincinnati 37
Williams and Company, Incorporated
(Valley 1-5555)
Cleveland 28
A. M. Castle & Co.
(Axminster 2-7600)
Cleveland 14
Williams and Company, Incorporated
(Utah 1-5000)
Columbus 12
Williams and Company, Incorporated
(Axminster 4-1623)
Toledo 12
Williams and Company, Incorporated
(Greenwood 5-8861)
OKLAHOMA
Tulsa 13
Metal Goods Corporation
(Temple 6-2561)
OREGON
Portland 9
Pacific Metal Company
(Capitol 7-0693)
PENNSYLVANIA
Philadelphia 34
Edgcomb Steel Company
(Garfield 3-6300)
Philadelphia 33
Metal Supply Company
(Center 6-0220)
Philadelphia 40
Whitehead Metals, Inc.
(Baldwin 9-2323)
Pittsburgh 33
Williams and Company, Incorporated
(Cedar 1-8600)
York
Edgcomb Steel Company (47-1931)
RHODE ISLAND
Slatersville
Edgcomb Steel of New England, Inc.
(Poplar 7-0900)
SOUTH CAROLINA
Greenville
The J. M. Tull Metal & Supply Co., Inc.
(Cedar 3-8366)
TENNESSEE
Memphis 6
Metal Goods Corporation
(Whitehall 8-3407)
TEXAS
Dallas
McCormick Steel Company
(CH 7-3104)
Dallas 35
Metal Goods Corporation
(Fleetwood 1-3271)
Houston 1
McCormick Steel Company
(OR 2-6671)
Houston 1
Metal Goods Corporation
(Riverside 7-1110)
UTAH
Salt Lake City 1
Pacific Metals Company, Ltd.
(Davis 8-2222)
WASHINGTON
Seattle 8
Ducommun Metals & Supply Co.
(Parkway 5-1500)
Seattle 4
Pacific Metal Company (Main 2-6925)
Spokane 4
Pacific Metal Company
(Keystone 5-3681)
WISCONSIN
Milwaukee 1
Central Steel and Wire Company
(Humboldt 1-5000)
Milwaukee 9
Steel Sales Co. of Wisconsin
(Hilltop 2-2020)

Call The Aluminum Man . . . his stock's the most complete!

Your Alcoa distributor sales representative—*The Aluminum Man*—maintains a warehouse bulging with sheet and plate; tube and pipe; extruded shapes; wire, rod and bar. His stock represents the widest range of aluminum products available from any distributor source. He can arrange for them to be slit, sawed or sheared to your specifications—furnish technical advice you may need on alloy selection and fabrication techniques. He's your fastest supply line for aluminum in any form when you need it. Your nearest Alcoa distributor is listed on this page, so give him a call . . . soon. Aluminum Company of America, 845-K Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM

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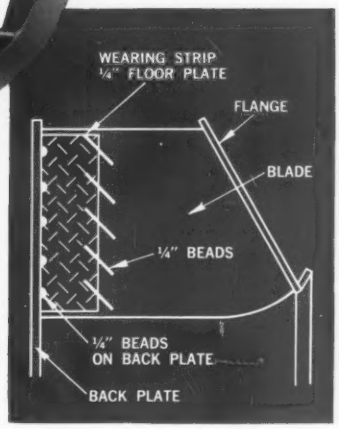
Call *The Aluminum Man* . . . he's your Alcoa distributor sales representative



Designed for the most rugged induced draft applications, 'Buffalo' Type "H" Fans withstand continuous abrasive wear at the highest static efficiency ever obtained with this type fan. Radial tip blades curve smoothly forward at the heel to meet incoming air at the optimum angle. A modified flange design produces streamlined flow of air from wheel entrance to tips of the blades. Welded wear strips (¼" steel floor plate) break up particle flow and prevent dust particles from gouging or scouring the blades. Particle buildup is eliminated... housing wear is negligible... turbulence is minimized. In addition, static pressure and capacity are increased... maintenance costs and sound levels lowered. 'Buffalo' Type "H" Fans are available in 15 sizes and a variety of widths for various capacity/pressure requirements. For all the facts, call the resident Buffalo representative nearest you. Or write our home office direct.

"Buffalo"

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

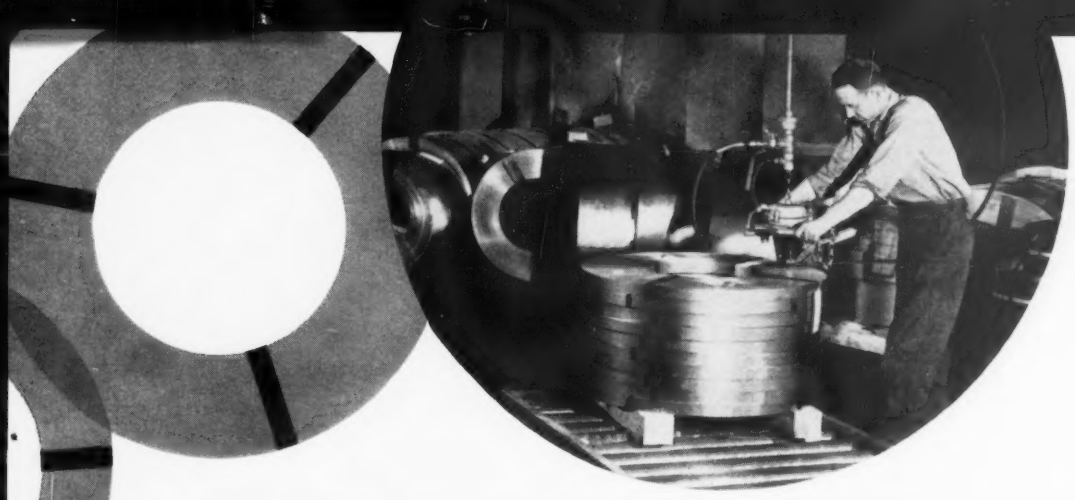
Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.



ACME STEEL MACHINES STRAP CIRCLES AROUND ANY OTHER METHOD

In the slit coil field alone, dozens of producers are proving that Acme Steel automatic strapping systems are the most productive partner slitting equipment ever had. For instance, the new F4 Strapping Machine and Indexing Table (at left) let one man completely strap as many as 150 coils *of any width* per hour—all through push-button control. And once secured, coils are unitized just as efficiently with Acme Steel portable powered strapping tools.

Thanks to this rapid, non-stop flow, existing slitting equipment can run *continuously* at full capacity, eliminating the need for investing in additional slitting lines in many instances. No wonder Acme Steel automatic strapping equipment can pay off in 18 months!

No field has a monopoly on these savings. Acme Steel equipment is scoring unparalleled productivity gains in strapping giant hot coils, paper, textiles, products and packages of every description . . . in bundling and unitizing such products as lumber, building materials, bar stock, pipe and sheet metals.

Full facts on industry's most proven and productive strapping systems are as close as your phone. Call your Acme Idea Man for an evaluation of your particular operation. Or, clip the coupon for case studies.

ACME STEEL **IDEA LEADER IN STRAPPING**

ACME STEEL COMPANY
Dept. SBS-101, 135th & Perry Ave.
Chicago 27, Ill.

Please send me detailed information illustrating how major companies in my field use Acme Steel Strapping.

*Name*_____

*Title*_____

*Firm*_____

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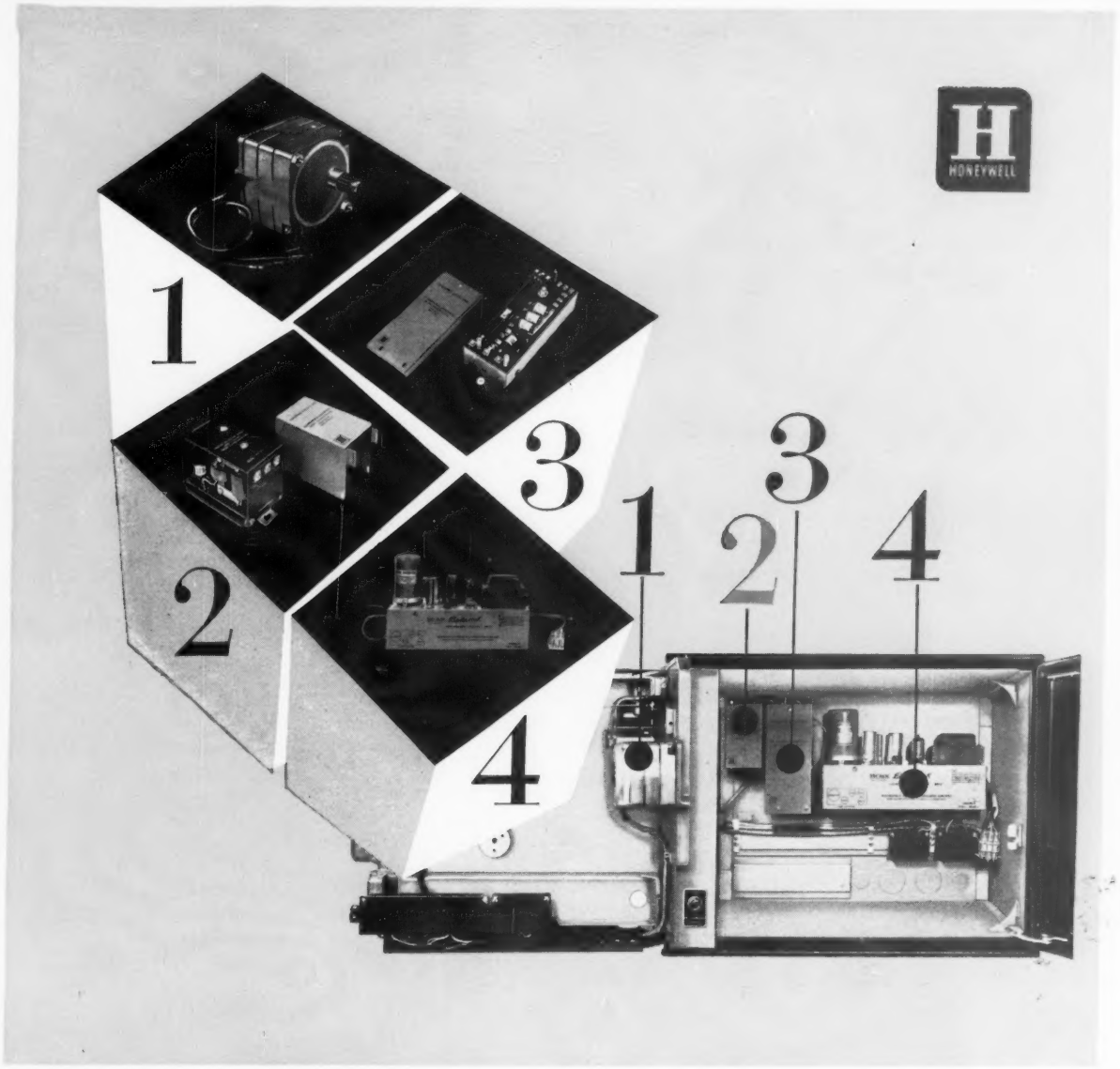
WASHBURN WIRE COMPANY NEW YORK CITY

WASHBURN

CLEAN, UNIFORM BILLETS - STRIP - RECTANGULAR, ROUND, FLAT RODS
TEMPERED AND UNTEMPERED FLAT AND ROUND HIGH CARBON WIRES



It's what's in the modules that matters!

Take the newly designed modules in ElectroniK 15 Potentiometers. These modules have operating and servicing features that represent the very latest developments in the art of reliable instrumentation—**1.** Sectionalized motor module makes servicing a snap. Any major part of the servo or chart drive motors can be replaced in a matter of minutes. **2.** Line-powered constant voltage module provides a completely automatic d-c voltage source and replaces batteries, standard cells, and standardization mechanisms. **3.** Quick-change measuring circuit module reduces range or actuation changes to simple screwdriver operation. **4.** Quick-connect amplifier module is easily removed for servicing. Over 15 models available—for gain up to 40 x 10^6, for input impedance of 400 to 50,000 ohms.

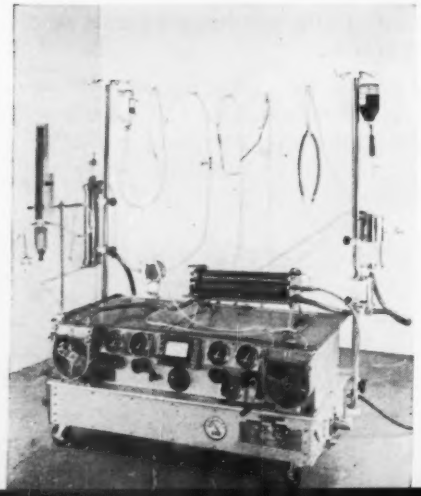
Get complete details by contacting your nearby Honeywell field engineer today. Minneapolis-Honeywell, Wayne and Windrim Avenues, Philadelphia 44, Pennsylvania. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell

First in Control

SINCE 1885

HONEYWELL INTERNATIONAL Sales and Service offices in principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



Heart surgery is always a matter of life and death.

The people who perform these operations and the equipment they use must work flawlessly. When they open the heart, it stops supplying blood to the body. So, they use an artificial heart and lung machine that pumps out the blood, keeps it at body temperature, removes carbon dioxide, adds oxygen and then returns it to the patient. This machine must not fail!

The design, construction and materials of the artificial heart and lung machine are the very best man can devise. Pemco, Inc. uses USS National Seamless Steel Tubing (Type 304 Stainless) for pump fittings, blood handling connectors and vessels.

For tubing that can meet the most critical requirements, ask for USS National Seamless Steel Tubing. National Tube Division, U. S. Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

This mark tells you a product is made of modern, dependable Steel.

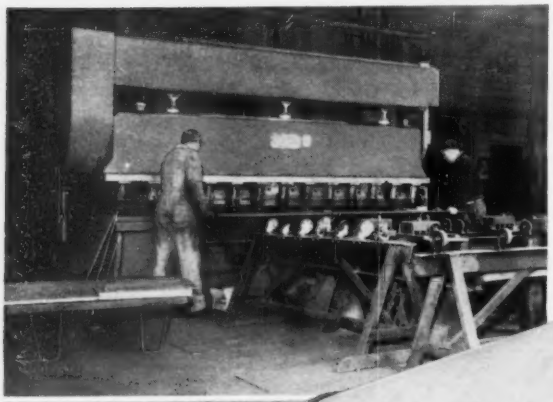
National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco Pacific Coast Distributors
United States Steel Supply Division
United States Steel Export Company, New York

CUTS MILLIONS OF FEET OF STEEL
SQUARE and ACCURATE

Steelweld Shear Speeds Big Pipe Line Shearing

This shear cuts pipe line plate accurately. It has been doing so for years with only minimum maintenance.



Three completed pipes ready for shipment. Size: 35'-6" x 54" dia. x ⅜" wall. Weight each: 9,315 lbs. Part of an order for 24,500 feet.

Other typical pipe orders: (a) 600 feet of 72" dia. x ½" wall; (b) 15,500 ft. x 48" dia. x ⅜" wall. All plates used for these pipes cut on four sides by Steelweld Shear illustrated.

Dominion Bridge Company, Ltd., is the largest steel fabricating concern in Canada. Among its many activities is that of making steel pipe for Canadian pipe lines. At its Pacific Division, Vancouver, B. C., pipe is made in various diameters, mostly 3'-0" to 5'-0", and usually in lengths of 35'-0" to 40'-0". Pipe walls generally range from ¼" to ½".

One typical order called for 35 miles of 36" pipe in 40'-0" lengths with ¼" and 5/16" walls. This required 10,000 tons of steel. Five to seven plates were used for each pipe. Each plate was cut on all four sides to assure accuracy and squareness required for perfect fitting. Over a million feet of steel was sheared for this job — all on one Steelweld Shear.

The machine worked 15 hours a day, cutting 12,000 to 14,000 feet. The knives needed turning to a sharp corner every 2 to 2½ months, which meant that only after 8 to 10 months of continuous production shearing was regrinding necessary.

Heavy construction of the shear, Steelweld's own air-operated clutch, easy knife adjustment to suit metal thickness, and electric foot switch control, are some of the factors contributing to the success of Steelwelds on hard service jobs.

Write for Catalog No. 2011

STEELWELD

PIVOTED BLADE *Mechanical and Hydraulic* **SHEARS**

Steelweld Machinery includes: Mechanical & Hydraulic Shears and Press Brakes, One-, Two- and Four-Point Straight-Side Presses, Speed-Draw Presses.

STEELWELD MACHINERY DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 7863 E. 282 ST. • WICKLIFFE, OHIO

NEW SAFETY SOLVENT HAS LOW TOXICITY

CHLOROTHENE® NU cold-degreasing solvent has all the desirable characteristics of the nonflammable chlorinated solvents *plus* less toxicity. Maximum allowable vapor concentration is a high 500 ppm compared to carbon tetrachloride at 25 ppm. Chlorothene NU shows outstanding superiority in its resistance to fire—it has *no* fire or flash point measurable by standard methods!

This combination of low toxicity and no flash point has led to the wide use of Chlorothene NU in production and maintenance cold-degreasing operations. Chlorothene NU specially inhibited 1,1,1-trichloroethane has an excellent low-corrosion record. It can be used safely on most electric motors, instruments, all common metals—including aluminum, zinc, and corrosion-prone "white-metal" alloys, and many plastics. It is easily recovered by distillation.

Use Chlorothene NU in *your* cold degreasing. Contact your distributor of Dow solvents for complete information about its safety features, uses, recovery and cost. Ask him about Dow trichloroethylene, perchloroethylene and methylene chloride, too. Or get in touch with your nearest Dow sales office.

SEE YOUR DISTRIBUTOR OF DOW SOLVENTS FIRST!

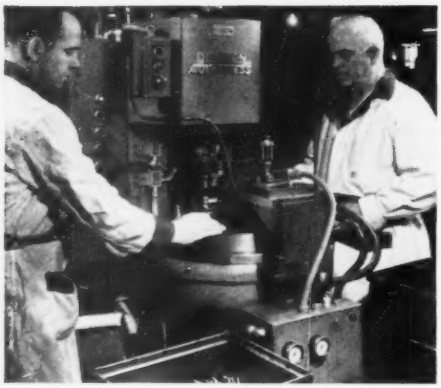
THE DOW CHEMICAL COMPANY DOW Midland, Michigan

Denison, Denison HydrOILics, and Multipress are registered trademarks of Denison Eng. Div., ABSCO

DENISON HydrOILics

How **STEWART-WARNER** produces 220 different assemblies on one **DENISON** Multipress and saves...

MONEY



THIS NEW SERIES "R" MULTIPRESS *assembles 220 different assemblies and prepares them for brazing at Stewart-Warner Corp., Chicago. Write for free Bulletin 324—New "R-S-T" Series Multipress.*

COST-SAVING versatility was a key requirement on this pressing job. To produce assemblies for a new product line, Stewart-Warner's Alemite Division needed a press set-up that could handle up to 220 different assemblies. And because of the short runs involved, fast changeover with minimum downtime was a must. *Installation of just one Denison hydraulic Multipress filled the bill.*

This Denison Series "R" 6-ton bench press, equipped with automatic index table and special "quick-change" tooling, assembles from 600 to 850 assemblies per hour. Finished parts are uniform, high-quality . . . *no rejects.* And tooling changes can be made in minutes to accommodate the full range of 220 different types and sizes.

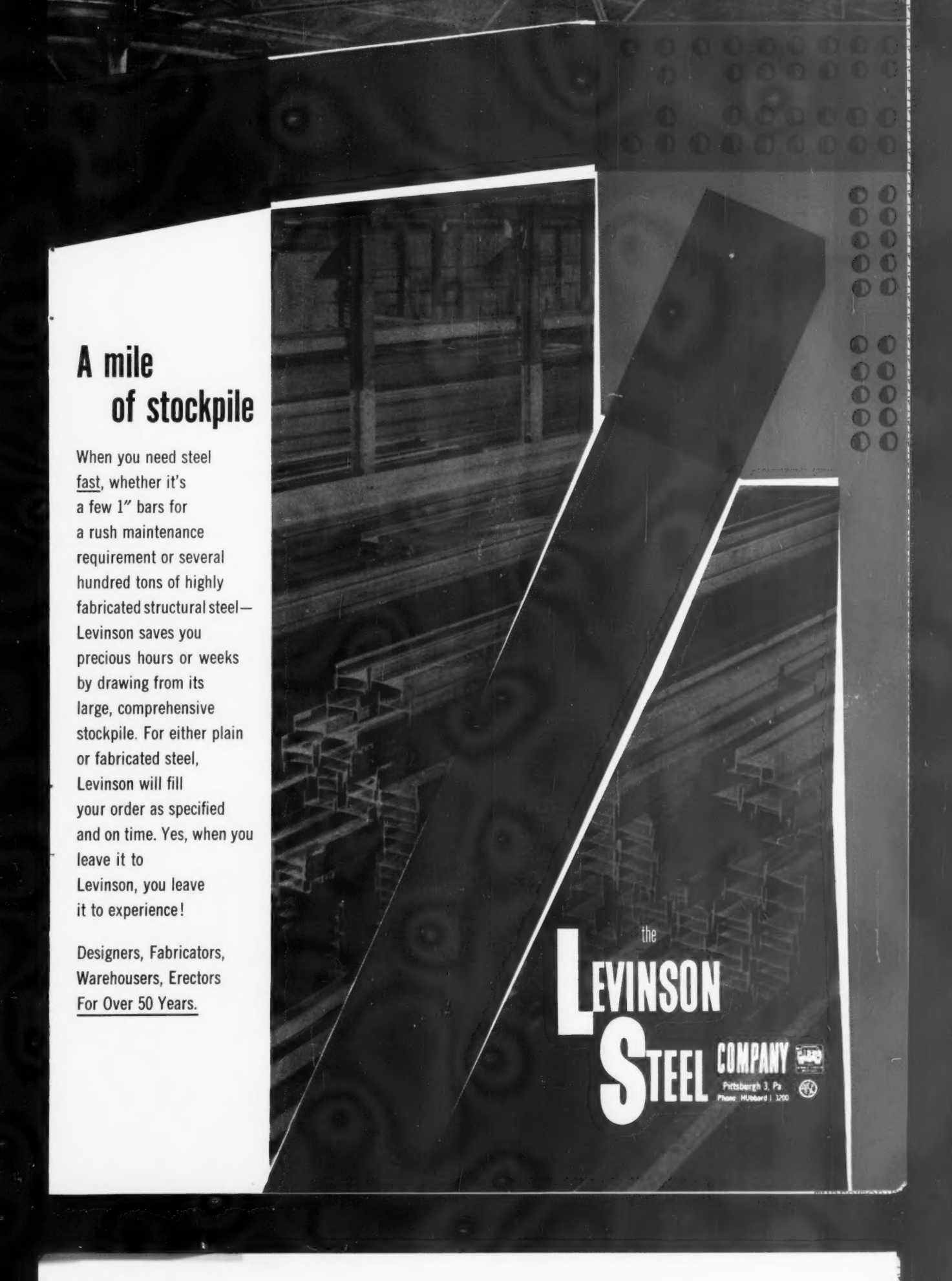
A unique feature of this operation is an adjustable applicator mounted on the index table that automatically applies a metered amount of brazing compound to each two-piece assembly. It completely eliminates a former hand operation—*and does the job better.*

What's *your* problem? Ask the nearby Denison Production Specialist about a **M**ultipress **A**nalysis **P**rogram in your plant now. It can **MAP** new ways to cut your costs, get better quality finished products.

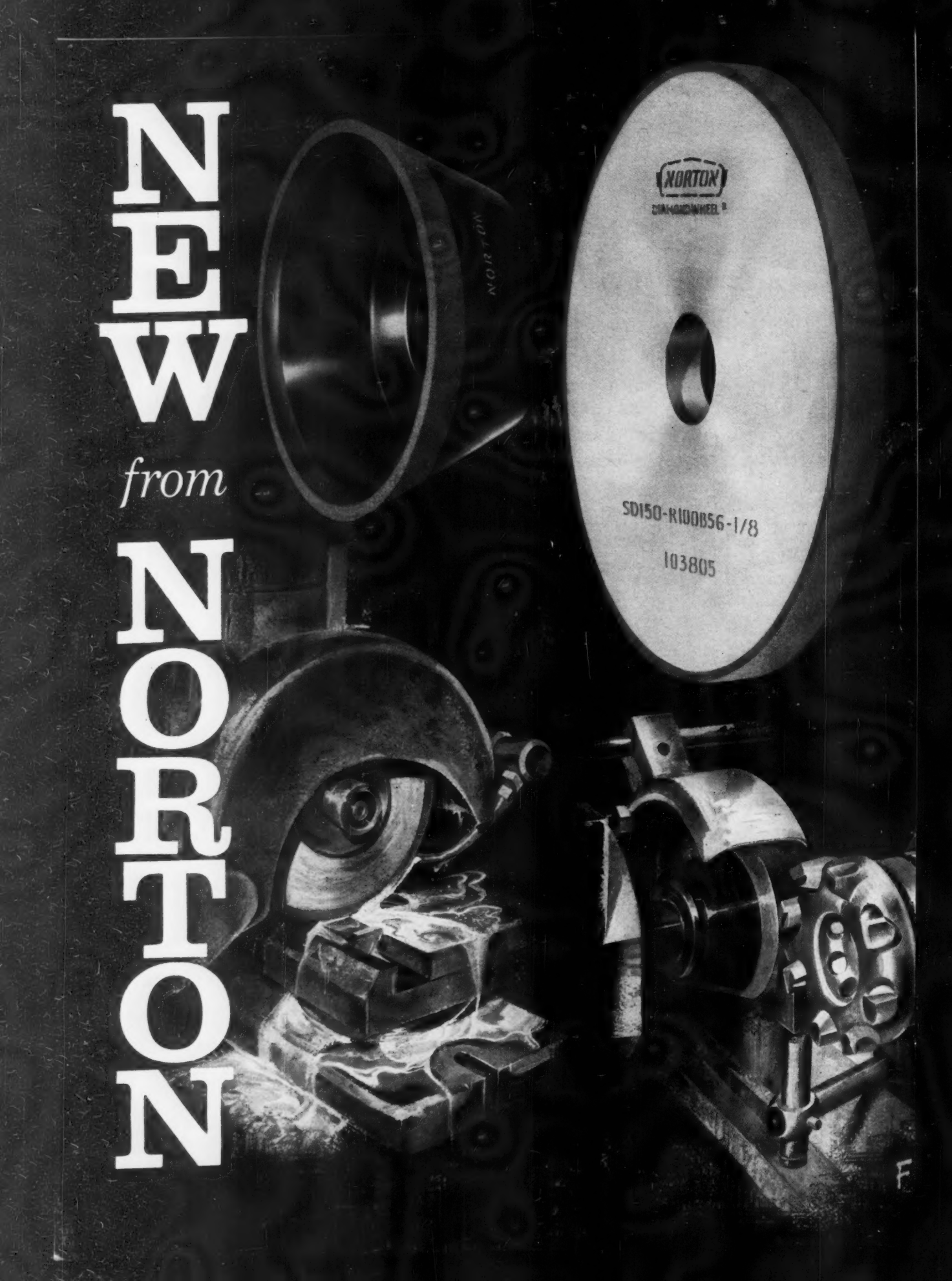
DENISON ENGINEERING DIVISION
American Brake Shoe Company
1180 Dublin Road • Columbus 16, Ohio

HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

DENISON
HYDRAULIC MULTIPRESS


A mile
of stockpile
When you need steel
fast, whether it's
a few 1″ bars for
a rush maintenance
requirement or several
hundred tons of highly
fabricated structural steel—
Levinson saves you
precious hours or weeks
by drawing from its
large, comprehensive
stockpile. For either plain
or fabricated steel,
Levinson will fill
your order as specified
and on time. Yes, when you
leave it to
Levinson, you leave
it to experience!
Designers, Fabricators,
Warehousers, Erectors
For Over 50 Years.
the
LEVINSON
STEEL COMPANY
Pittsburgh 3, Pa.
Phone: HUbbard 1200

NEW *from* NORTON



THE DIA-CROWN LINE...

with the first really new bond in all diamond wheel history!

...B-56, an unparalleled advancement for all carbide grinding ...wet and dry

Since Norton Company developed the first diamond wheels for industry in 1929 it has been the leader in diamond wheel progress — first the resinoid bond, then the metal and vitrified bonds.

Now comes another "first" from Norton, a brand-new bond, the B-56, an outstanding development combining greater productivity and economy for either wet or dry carbide grinding in ONE bond — providing the finest diamond wheels, the Dia-Crown line, ever produced for tool sharpening, die grinding and all other carbide toolroom or production jobs.

In test after test on the widest range of carbide grinding, wet and dry, in customers' plants, Norton Dia-Crown B-56 wheels have outperformed all other wheels with major results — per job — including the following:

- Increased volume of carbide removed, per unit of time.
- Longer wheel life without sacrificing speed of cut.
- More workpieces handled per wheel.
- Considerably lower wheel cost per cubic inch of carbide removed.

Believable? . . . It sure is! Look at these quotes from customer reports!

"*Wheel was so good we could hardly believe it, and checked test results again . . . still showed 30% longer wheel life.*"

"*This wheel reduced grinding costs from 13¢ to 7¢ per tip.*"

"*An extremely fine wheel. Cuts more carbide in a given time than any other wheel.*"

"*Best wheel ever used. Will convert to this for all our diamond wheel operations.*"

That's what our customers say — and it's due to this entirely new Norton resinoid bond — a truly outstanding development. Norton Dia-Crown wheels with this new bond are available in all types and sizes for carbide grinding. Remember, too, that if two wheels of the same size and type have been required for wet and dry grinding — this ONE new wheel will now do both — wet *or* dry, reducing inventories and cutting costs.

Get complete facts on how this new Dia-Crown line of diamond wheels can improve your carbide grinding and save you time and money. See your Norton Man, a trained Abrasive Specialist, or your Norton Distributor. NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

NORTON
ABRASIVES

W-2024

Making better products . . . to make your products better

NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — **BEHR-MANNING DIVISION:** Coated Abrasives • Sharpening Stones • Pressure Sensitive Tapes

FRASSE
for tubing

- Seamless Mechanical Tubing
- Welded Mechanical Tubing — Round, Square & Rectangular
- Pressure Pipe & Tubing
- Seamless Hydraulic Tubing
- Welded Hydraulic Tubing
- Centrifugally Spun Tubing
- Hollow Structural Tubing — Square & Rectangular
- Stainless Seamless Tubing
- Stainless Welded Tubing
- Stainless Seamless Pipe
- Stainless Welded Pipe
- Aluminum Tubing & Pipe

New Grades — New Shapes — New Sizes . . . *all* are included in the new extensive expansion made in the size and scope of Frasse tubing stocks. You can be more selective than ever — with the unusually complete tubing inventories *now* available. For, while only the major additions are highlighted above . . . *practically all* Frasse tubing grades have been recently supplemented.

Whether it's for a new application — or a standard requirement . . . you'll find it more convenient to order your tubing from Frasse. With Frasse as your tubing source — you have quick access to a variety of grades, shapes and sizes that will meet every normal tubing requirement . . . *and* you avoid needless "shopping". Then too, quality need never concern you . . . for every tubular item carried meets rigid standards set by Frasse tubing specialists.

Broad selection — top quality — quick delivery — dependable service . . . these are the plus-values you get by ordering your tubing from Frasse. For a quotation on your requirements — or a fast delivery . . . call us.

Peter A. Frasse & Co., Inc.

STEEL SERVICE CENTER INSTITUTE

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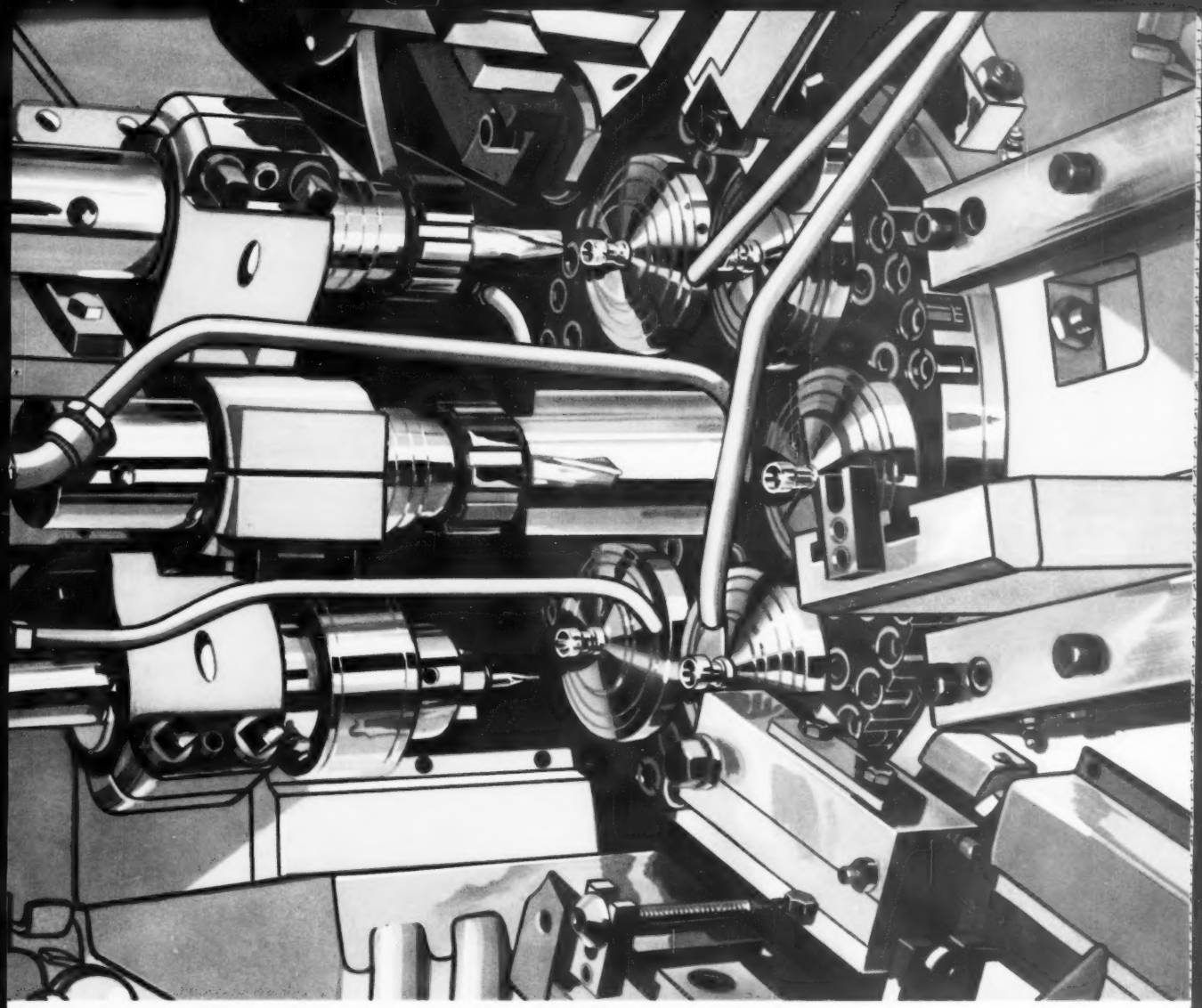


The newest bar machines *are New Britains*

How much work can you wring out of a bar machine? It depends on the machine, how it's tooled and who's using it. New Britain's New-Series Bar Machines are setting some pretty enviable productivity records right now. These machines, redesigned from the ground up, are the most advanced units of their kind available to the metalworking industry.

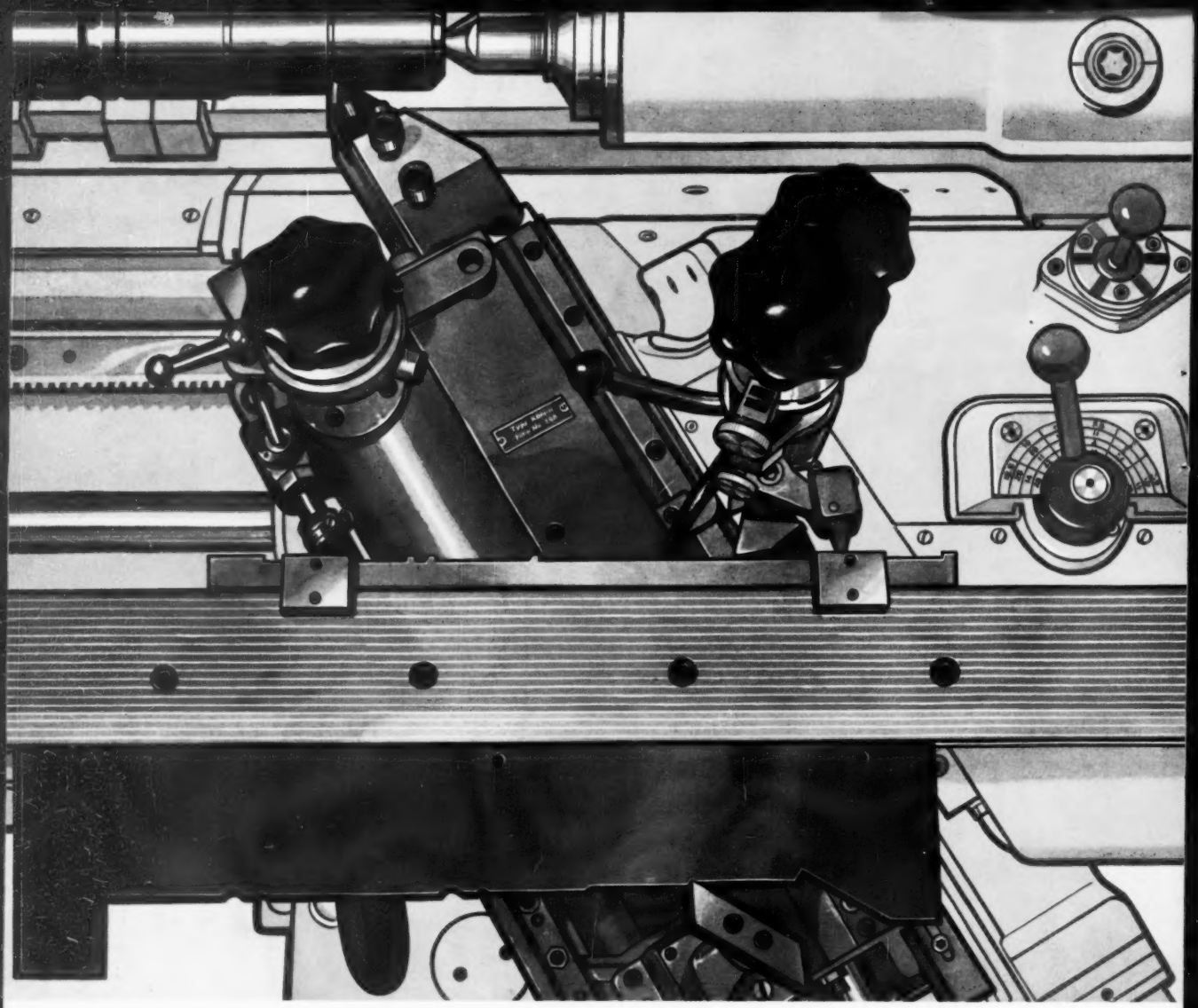
The four-spindle machines have capacity up to 5⅛″ and all the massiveness and power needed to turn work of this size.

New series six-spindle machines in various models have capacities ranging up to 3½″. The eight-spindle machines take work to 2⅝″ capacity.

Increased capacity is only part of the story. Tooling combinations are practically limitless. With end-working and cross slide tooling in every position on every model, the greatest possible variety of operations can be performed to the highest order of accuracy. Numerous familiar New Britain features, like spindle carrier lifting and locating, have been retained and improved. A great many exclusive new features have been added.

Why not send for our new catalogs which give the whole story in detail or call your New Britain representative to arrange a demonstration?

THE NEW BRITAIN MACHINE COMPANY
New Britain-Gridley Machine Division ◆ New Britain, Connecticut



Fast set-up, quick changeover *with New Britain* +GF+ *copying lathes*

The basic design of a New Britain +GF+ copying lathe can start to save you money on the first job you put on it. Because the single tool is guided by either a prototype or a template, set-up time is reduced to minutes. The single tool can be changed in minutes, too. Every dimension is positively transmitted from template or prototype to the work, making adjustment a simple matter of bringing only one dimension to size. A +GF+ does a great variety of work—shafts, chucking work, internal *and* external copy turning. Backfacing is accomplished by a simple attachment. Multi-cut recycling for the removal of heavy stock concentration can also be provided.

The versatility of application is pretty much limited only by the ingenuity of the individual. For more complicated jobs, New Britain can provide the most complete selection of steadies, special tooling attachments and other accessories available for any lathe anywhere. A complete range of models and sizes is available. Why not write for our new +GF+ copying lathe catalog?

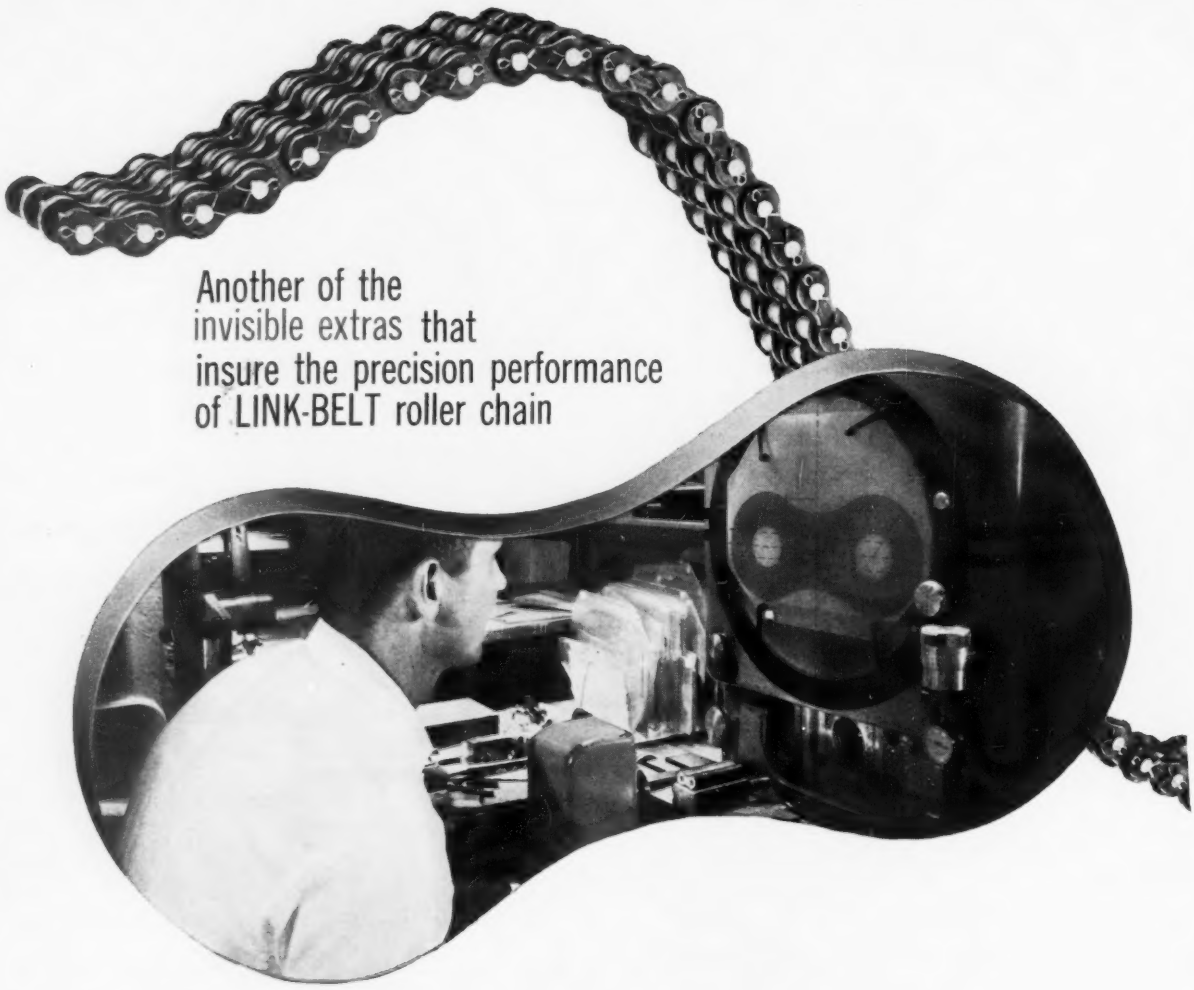
THE NEW BRITAIN MACHINE COMPANY

New Britain-Gridley Machine Division • New Britain, Connecticut

A roll's life holds no secrets

Men like National's metallurgist Joe Marsalka see to that. Before your roll is born, National helps select the proper composition, grade and hardness. As it is being produced, our metallurgists carefully control chill locations, pouring procedures and heat treatment. When the roll is "full-grown" ultra-sonic testing equipment checks its internal soundness making sure your roll is ready for the tough life ahead. Even after your roll is shipped, National keeps in touch with its performance in your stand. This intimate knowledge of roll life is one reason we are able to consistently produce quality steel, iron and nodular iron rolls. It's a big reason why... NATIONAL'S THE GROWING NAME IN ROLLS.

NATIONAL ROLL & FOUNDRY DIVISION
GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
General Steel Industries, Inc., General Offices: Granite City, Ill. Plants: Granite City, Ill., Eddystone, Pa., Avonmore, Pa.
Subsidiary: St. Louis Car Company, St. Louis, Mo.



Another of the
invisible extras that
insure the precision performance
of LINK-BELT roller chain

Optical comparator inspection guarantees

precision of every part

Precision is *rigidly practiced* in every step of Link-Belt's roller chain production. The optical comparator is an example of the specialized equipment used to assure precise manufacturing control of chain parts and tools. It is capable of magnification up to 100 times.

Continuous inspection is just one of the *invisible extras* that contribute to the greater strength and endurance of Link-Belt roller chain. Others include precise heat-treat control, prestressing, pitch-hole preparation, shot-peening and burnishing of rollers.

Double- and triple-strand LINK-BELT steel roller chains easily handle the heavy loads encountered by this storage table drive.

These features—plus painstaking precision in every step of manufacture—assure you of chain that can easily cope with today's heavy loads and high drive speeds.

For engineering assistance in applying industry's preferred roller chain, contact your nearest Link-Belt office or authorized stock-carrying distributor. See CHAINS in the yellow pages of your phone directory.

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,597

LINK-BELT

ROLLER CHAINS AND SPROCKETS

Rx for Growth

Clifford D. Nelsen of Nelsen Steel & Wire Co. did not receive a letter from President Kennedy, asking him to hold steel prices despite the Oct. 1 wage increase. Possibly that was because Nelsen is a company with fewer than 100 production workers. But Mr. Nelsen does have some ideas on the subject. (They appear on Page 76.)

Mr. Nelsen suggests: If we had a modern depreciation policy, industry could take advantage of our new equipment and new technology to increase efficiency. Resultant higher productivity would permit the making of steel—or any metalworking product—at lower cost. Industry could take on rising costs—like wages—without marking up prices. Possibly, it could even trim them back.

We believe that is a thought for the President and the Congress to ponder.

Of course, it is too late to solve the immediate situation. Promises to the contrary, Congress adjourned without any action to stimulate capital investment and without even considering real depreciation reform.

But the problem will still be here when they return in January. And so will the opportunities.

Tremendous and exciting advances have been made in the technology of metal production and metalworking in the last few years. But many of the developments have not been utilized. One major reason is that the new technology requires new equipment, and the metalworking and metal producing industries have not been able to finance the purchase of the required machinery.

Americans everywhere are concerned about the slowness of our economic growth compared with that of our competitors abroad. We are gravely concerned over our ability to compete in the burgeoning world market. We are handicapped by higher labor costs than those of overseas countries. The added cost can only be offset if our equipment and technology are superior.

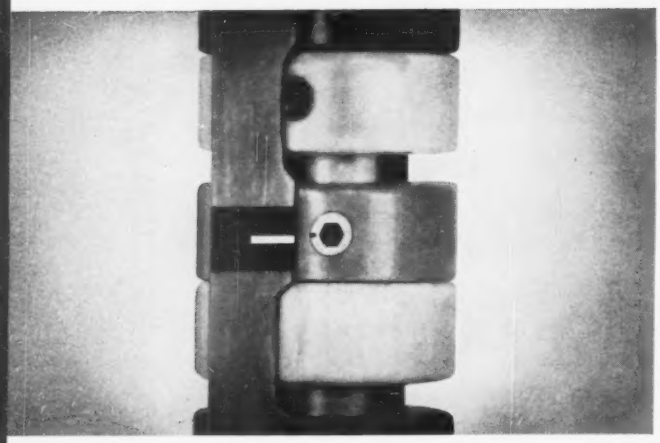
Under this country's outmoded depreciation laws, our equipment is growing older and more obsolete, and our newer technologies are being wasted.

We agree with Mr. Nelsen that it is high time for industry to tell Washington the economic facts of dynamic growth.

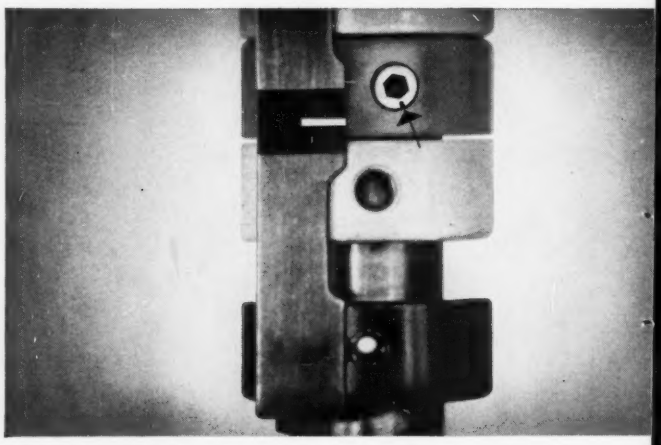
Walter J. Campbell

EDITOR

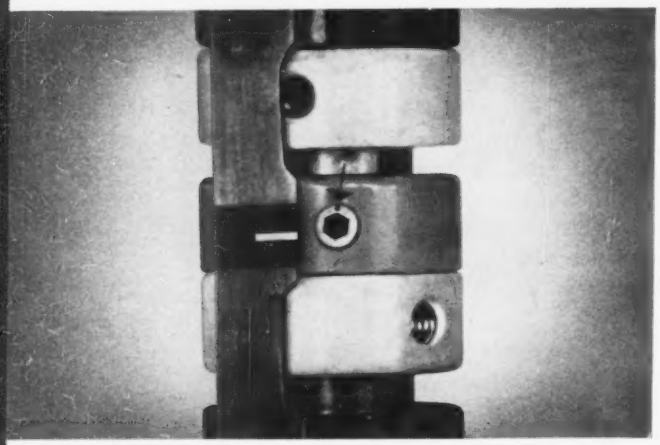
SPS self-locking fasteners sit tight



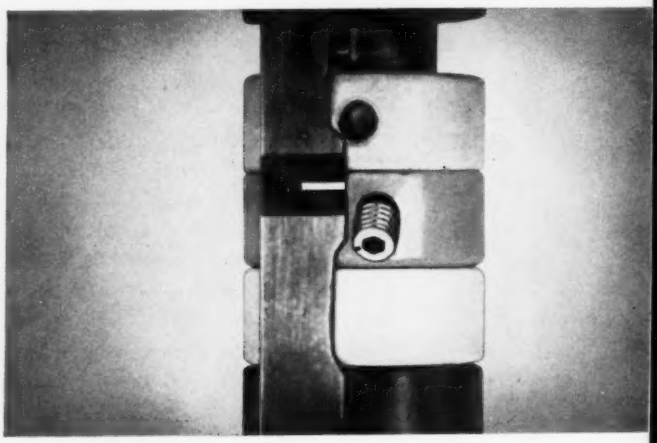
PLAIN CUP POINT *Socket Screw is tightened between two loose collars in Impact Induced Vibration Tester. Mark on socket screw lines up with index on machine.*



AT 1275 CYCLES *a minute, high speed camera catches test collar being pounded by loose collars above and below. Note that plain cup socket screw has already turned 90 degrees, collar has started to creep.*

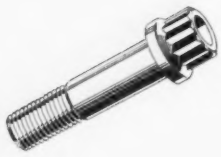


IT'S LOOSE—*In less than 30 seconds, plain cup socket screw has turned 270 degrees, is completely loose. Test collar is now riding free on shaft.*

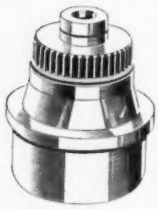


OUT IT COMES! *A few seconds later plain cup socket screw drops out of collar. In same test,* SPS UNBRAKO *Socket Screw with knurled cup point stayed in more than 4 minutes—over 8 times as long.*

INDUSTRIAL FASTENERS like this UNBRAKO Socket Head Cap Screw are produced to a dynamic reliability standard as a result of SPS research. The SPS line includes a limitless variety of self-locking screws, locknuts and precision fasteners for everything from massive machinery to the most minute products.



AIRCRAFT/MISSILE FASTENERS like this bolt are produced to ultra-high performance standards at SPS. Today's lightest, strongest fasteners in standard and special designs are products of SPS. Research and development work includes titanium, beryllium and other lightweight, high-strength exotic metals.



NUCLEAR COMPONENTS like this cap for a core housing are held to almost unbelievable dimensional tolerances. The nuclear energy field depends on SPS for threaded fasteners, control rod drive mechanisms, motor tubes, core components, instrumentation housings and many other essential parts.

while others get the shakes

Vibration is a killer.

Once it succeeds in working a fastener loose, things start coming apart in a hurry.

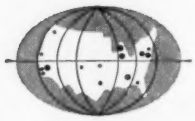
Some of the simplest, but most ingenious, engineering devices known to man now prevent vibration loosening of fasteners. When made right, and installed properly, they solve the vibration problem easily and economically.

The SPS family of self-locking fasteners includes such well-known names as UNBRAKO knurled point set screws that get a firm grip on the material they seat against . . . UNBRAKO with Nylok*, a nylon pellet in the thread area . . . Sel-Lok spring pins that expand against the hole walls . . . and Flexloc nuts with locking collars that squeeze the bolts for holding power.

All are re-usable. All can be installed quickly without special tools. And the reliability standards to which each is manufactured insure vibration proof performance in everything from power mowers to missiles.

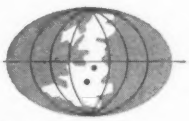
Samples of any of these SPS self-locking fasteners will gladly be furnished upon request.

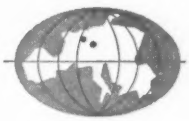
*T.M. Reg. U.S. Pat. Off., The Nylok Corp.



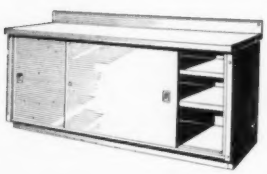
SPS

where reliability replaces probability





STANDARD PRESSED STEEL COMPANY, Jenkintown, Pa. • SPS Western, Santa Ana, Calif. • The Cleveland Cap Screw Company, Cleveland, O. • Columbia Steel Equipment Div., Fort Washington, Pa. • International Electronic Industries, Inc., Nashville, Tenn. • National Machine Products Div., Utica, Mich. • Standco Canada, Ltd., Toronto, Canada • Unbrako Socket Screw Co., Limited, Coventry and Sheffield, England • Unbrako Schrauben GmbH, Dusseldorf and Koblenz, W. Germany.



SHOP EQUIPMENT for industry and schools is made to the same superior quality standards as other SPS products. The Hallowell line offers broad coverage of standard and special needs in work benches, shelving, and similar equipment. Ruggedness and space efficiency are well identified with Hallowell.

OFFICE FURNITURE like this handsome Columbia Nine-to-Five unit sets an office apart with distinctive styling and color combinations. The complete line includes efficiently designed, durable steel office furniture, plus special units, a wide choice of smart chairs, filing cabinets and accessories.

CAPACITORS FOR ELECTRONICS bearing the IEI trademark are widely used for subminiature circuitry and transistorized applications. This SPS company makes both aluminum and tantalum capacitors, including the lightest and smallest per given capacitance in the industry, to the highest quality standards.

SANDVIK *"Tortures"*

SPRING STEEL

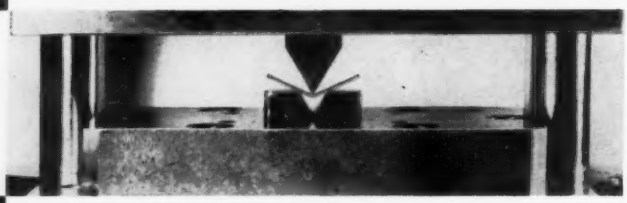
To Give You *Predictable Performance*

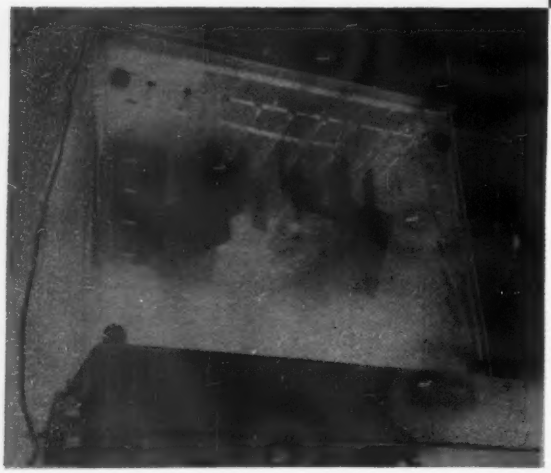
Here are a few of the laboratory tests Sandvik uses to determine exactly what specific Sandvik spring steels can endure.

Sandvik's scientific testing and rigid quality control insure consistent, superior performance in spring steel applications.

◀ A Sonntag machine testing the fatigue life of Sandvik steel sample by subjecting it to alternate bending stresses. Other types of test machines known as high frequency pulsators are used to apply tension-pressure stresses or pulsating tension stresses. These tests are performed to achieve maximum toughness to assure predictable end product performance.

The bending properties of a Sandvik spring steel are tested in an excenter press. Stresses are varied by changing the angle and bending radius of the tool, so as to assure maximum formability and high hardness. ▶





◀ Samples of Sandvik stainless spring steels being tested in a corrosion chamber simulating field conditions to develop maximum corrosion resistance in conjunction with desired fatigue characteristics.

Ask your nearest Sandvik office for further information or technical assistance on your spring steel requirements.

SANDVIK STEEL, INC.
Fair Lawn, N. J., SWarthmore 7-6200 • In N. Y. C., ALgonquin 5-2200
CLEVELAND • DETROIT • SKOKIE, ILL. • LOS ANGELES
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88-239

Spring Steel

Steel Belt Conveyors

Coromant Carbide Tools

Springs

Hand Saws & Tools

SANDVIK

STEEL

"The one most pressing goal of the copper industry is basic research and development"

FRANK R. MILLIKEN
President
Kennecott Copper Corp.

Copper Research Stepped Up

THE ABOVE QUOTE from Kennecott's new president sums up the prevailing attitude among top copper managers. Significantly, it is being translated into concrete projects:

- Kennecott is building a multimillion dollar laboratory for basic research. Primary emphasis will be on the solid state physics of metals.
- Anaconda Co., New York, late last month officially dedicated a 50,000 sq ft, $1.5 million research center at its Anaconda-American Brass Co. division in Waterbury, Conn.
- Companies all over the Free World have banded together in a major basic and applied research program through the newly formed Copper Products Development Association (CPDA, see Page 74).

• **Shift of Emphasis**—The swing to customer oriented research is a new role for the copper companies. Until recently, the producers viewed themselves basically as miners. Most research was concerned with better and more efficient ways to extract the ore and process it into a quality raw material for industry. Product research, particularly in the area of new uses, more often than not was left to the customer. Basic research was virtually nonexistent.

A quick glance at some of CPDA's projects illustrates the new emphasis:

- The addition of copper to gray iron castings. Researchers say copper reduces the tendency of gray iron to chill, increases corrosion resistance, decreases porosity, and gives better machinability.
- Using copper to improve internal combustion engine performance and to prevent discharge of smog forming gases. Possible applications: Placing copper additives in fuels as combustion catalysts. Using copper in combination with other metals

Copper Highlights

SALES
Possible Peacetime Record in 1961.

SUPPLY
Capacity at All-Time High.

PRICES
Becoming More Stable.

IMPORTS
Down Sharply for Fabricated Products.

MARKETS
Research, Marketing, Promotion Stepped up Sharply.

Tarnish-Free Copper

THAT'S THE TOP research goal of the Copper Products Development Association, an 18-month-old organization headed by Dr. Charles H. Moore, a metallurgist, chemist, geologist.

CPDA, whose members (34 companies in 11 nations) produce over 90 per cent of the Free World's copper, has embarked on five projects, ranging from the basic study of the copper atom to advanced product development.

The "stainless copper" referred to in the headline may be developed by forming a thin, transparent film of oxide of another metal on the surface of copper. Or it may involve transparent plastic coatings and other organic and inorganic finishes. Or it may mean electrically changing the surface characteristics of copper. All approaches are being studied.

Other studies: Probing copper's crystal structure (to find why surface reactions to various gases occur) and to obtain essential information on the metal's structure and atomic properties.

CPDA's twin purpose, whether in basic research or product development, is to protect and expand

traditional markets and develop new ones. Says Dr. Moore: "We do not claim that our intent is to win back markets that aluminum, plastics, and stainless steel have taken. Instead, we plan to develop copper as the one best material for specific uses, regardless of price or competitive material."

in engine heads or other parts that touch the combustion chamber (to obtain a beneficial catalytic effect).

• Increasing copper's use in construction, such as gutters and downspouts. A high strength alloy, no thicker than 0.020 in., might reduce the cost differential between copper and competing materials, simplify installations, and make the system more rigid. Lower price, easily installed copper roofs are also being investigated. Involved: Thin copper sheet bonded to materials such as plywood, asbestos, or felt, to provide needed thickness, resistance to mechanical damage, and insulation value.

• The Causes — Today, spiraling technology and the fierce competition among materials have wrought significant changes, both in attitude and activity. Anaconda's Chairman Clyde E. Weed sees the swing to research as a great opportunity.

Says Mr. Weed: "I call these the opportunities of necessity. The advancing pace of scientific developments, the rapid growth of population and increased consumer demand place a heavy burden upon the industry to satisfy the peaceful and defense needs of the Free World for minerals, metals, and their products."

Today, the copper industry must think in terms of tomorrow's demands, believes Mr. Weed. "We are entering a phase of scientific development known as materials engineering. We must devote much of our attention to this important area. New requirements will call for combinations of metals and alloys as yet untried. Our purpose should be to search constantly for such combinations and to make them commercially available."

• Supply Spurs Research — A big reason research was often neglected in the past was a lack of incentive. Supply sometimes was so tight the problem was not to sell the metal, but how to allot it. The result: Shrinking of some markets.

Today, the story's different. Free World producers have brought in enough new mines to lift annual capacity to about 4.1 million tons, probably around 350,000 tons in excess of Free World demand this year. More capacity is on the way.

Simon D. Strauss, vice president sales for American Smelting & Refining Co., New York, sums up what this means to users: "Unless serious and prolonged disruptions in supply occur, there will be plenty of copper to meet projected demand."

• Hefty Sales in '61—This capacity surplus can be a mixed blessing to the industry. Excess output tends to depress the price, particularly when business is slow. That's why over the last two years you've seen voluntary production curtailments. This year, though, sales are anything but slow. In fact, deliveries will be the highest in five years, and they could be the best since

World War II. The consensus is they'll hit well over 1.4 million tons (compared with 1,279,745 tons in 1960).

Why has copper bounced back from the recession faster and harder than any other nonferrous metal? The answer is fourfold:

• Business is better. Nowhere is this better illustrated than in shipments of brass mill products. They'll hit 1.75 billion lb or better this year compared with 1.6 billion lb in 1960.

• Consumers have rebuilt inventories. When the year began, customer stocks were way below normal. As the year has progressed, they've been rebuilding inventories to more normal levels.

• Imports of fabricated copper goods are down sharply. For example, brass mill product imports, which totaled 164 million lb in 1960, fell to 60 million lb in the first seven months of this year. Lower imports, of course, have increased the market for U. S. fabricators and consequently copper producers.

• A big chunk of the heavy tonnages of scrap exported this year has been of the type normally used by the U. S. brass mills. Unable to get this scrap, mills have bought more electrolytic copper. Naturally, this benefited the primary producers. The custom smelters, who also rely on scrap as a raw material, haven't been able to reap the benefits of the better demand for copper (see Nonferrous column on Page 200).

• **Boom Fades Overseas** — Outside the U. S., demand for copper is not so strong. Free World deliveries this year will total about 3,750,000 tons compared with 3,606,766 tons in 1960. All the gain will come from increased U. S. business. Deliveries outside the U. S. will dip as a result of the slowdown in the European boom.

Free World refined production will run slightly under deliveries. Estimates put the figure at 3.7 million tons. Producers have been trying to keep production more in line with sales. They've been aided by work stoppages like the ones in August that resulted in 50,000 tons of lost production. Stocks of refined copper remain high outside the U. S. (329,735 tons at the end of August) and low inside this country (95,177 tons).

There has been a heavy workoff in U. S. stocks this year (they stood at 144,000 tons in January). That's why through July this country had exported 20,000 tons more than it imported. The U. S. will continue to be a net importer of copper, but it is becoming more self-sufficient.

• **Prices More Stable**—The primary copper price has changed only twice this year—two, 1-cent-a-pound reductions in May that took the price from 33 cents to the present 31 cents. There's more stability than formerly. Evidence: The domestic price remained firm a few weeks ago despite a major strike in the U. S., the shutdown of all Chilean production, and unrest in Africa. Major producing nations are making a greater effort to reduce price fluctuations.

Lately, some weakness has taken place in European prices. If the differential should reach 3.5 cents a pound, it would create pressures on the U. S. price. Odds are, however, that U. S. prices will hold at present levels throughout the year.

• **What's Ahead** — The copper industry's future has never looked brighter. Producers are serious about building new markets through research. Market research and promotion have been stepped up.

The industry has going for it the highest capacity in history, greater price stability, fewer imports to compete with (though this may be temporary).

In 1962, sales should gain, believes Mr. Milliken. Some problems will also have to be faced next year: Labor contracts expire in midsummer. African unrest continues to threaten that country's production. The problems of scrap exports (if they stay high) will have to be resolved.

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

'Project Detroit'

MARKET DEVELOPMENT is being accelerated too. Richard D. Chapman, former assistant chief engineer, Chrysler Corp. basic sciences research, has been tapped by the copper industry to spearhead technical and product liaison with automakers.

Mr. Chapman will head up a new Detroit office of Copper & Brass Research Association.

The auto industry is the largest single market for copper mill products. About 200 million lb were used in 1960, but usage has been declining as certain traditional items become smaller—radiators are an example—and competing materials gain.

Daniel B. Nelsen Sr.
President

Clifford D. Nelsen
Vice president

Nelsen Steel & Wire Executives Charge:
We don't want a price increase... it'll put us at an even greater disadvantage in world markets... there is an alternative—realistic depreciation... in the final analysis, the choice rests with the government . . .

Small Steel Speaks Out on Prices

"IT'S TIME we in the steel industry took the offensive about what must be done to solve our problems. We've been quiet and complacent too long. We've been badgered and made the whipping boy. And now we're being made the scapegoat again . . . being pictured as a group of money grabbers . . . lurking in the shadows for an opportune time to trigger inflation."

So charges Clifford D. Nelsen, vice president, Nelsen Steel & Wire Co., Franklin Park, Ill. Employing less than 100 production workers, Nelsen Steel & Wire produces cold finished bars for the auto, aircraft, machine tool, and farm equipment industries. Its annual rated capacity is over 150,000 tons.

"As a representative small manufacturer, we resent such implications. Even though the administration's blast was leveled only at the larger steel companies, the entire industry is in danger. We of small steel also rise to the industry's defense.

"We must stop turning the other cheek, especially in view of the fact we're being slapped around by the very government so largely responsible for our predicament.

"We don't want a price increase. Who should know better than we in the steel industry that higher prices at this time would put us at an even greater disadvantage in the world market? Also, doesn't the administration realize that if inflation should come, the dollars the steel industry spends and receives would be just as eroded as everyone else's?

"Fortunately, there *is* an alternative to a price increase. That alternative is action leading to a realistic, modern, depreciation allowance.

"The present method is a failure. It is deficient, inefficient and insufficient. It has hurt the steel industry. It has contributed substantially to higher costs and to our steadily weakening position.

"Significantly, the dismal depreciation program that handicaps our industry is set by the government. The administration, therefore, could serve the cause of a strong, healthy economy better by changing its attitude toward the steel industry. Instead of threatening us and treating us like economic black sheep, why doesn't the administration take steps to remove the government imposed shackles that have pushed the steel industry to its present predicament?

"Possibly we in the industry have been lax in failing to tell our story and explain our problems to the government. Our problems are complex, but they can be summed up, for both small and large companies, in this way:

"1. We're in dire need of new, modern, and more efficient equipment.

"2. We don't have the money to buy what we need."

• **Old Equipment**—"It would be easy for the President or his ad-

visers to determine our urgent need for new machinery. If the President were to make just a quick tour of representative plants, he'd probably be shocked to find that many companies are trying to produce steel on equipment that can best be described as junk! Machinery that was obsolete as far back as World War II is still being used today.

"Why this reliance on antiques? Because many companies can't afford the new equipment they need. Why can't they afford it? Because the money has to come out of profits—and profits have been less and less year after year.

"The fellow who told the President the steel industry could absorb higher costs and still make a 'good profit' apparently hadn't bothered to look at the figures. In 1960, net profit as a percentage of sales (5.73 per cent) was the lowest since 1953 (5.61 per cent). Of 41 industrial classifications included in a recent survey, only seven were listed as showing smaller profit return on investment than the steel industry.

"In other words, our industry ranks near the bottom as far as profits are concerned. If we can't make a profit, how can we get the money to modernize? How can we attract the necessary risk capital?"

• **What's Wrong with Profits?**—"There seems to be a conspiracy in some quarters to discredit the role of profits in business today, to make profits a dirty word and to depict it as something immoral. But why shouldn't we want to make a profit? As far as the steel industry is concerned, it's important to the entire nation that this segment of the economy be kept vital and strong. This means we must continually be able to produce new and better products in new and better ways so we can meet the challenge of the times and fulfill our responsibilities to our nation and to the Free World. To do so requires profits.

"One apparent solution to our problem is a price increase. Although it isn't the most desirable solution, it appears to be the industry's only recourse under present conditions and government restrictions.

"A more desirable approach, however, would be a new depreciation program that would recognize conditions as they really are and that would allow for a realistic writeoff of new or rebuilt equipment commensurate with technological advancements and increasing replacement costs.

"Theoretically, the present depreciation allowance was intended to create a capital reserve for replacement of old and wornout machinery. Yet the theory has failed to work out in practice. In many cases, unfortunately, the reserve turns out to be (around) 20 to 30 per cent of the actual replacement cost. This hurts even the bigger companies in the industry. Even with their supposedly larger financial resources, they just can't cope with the replacement problem as effectively as they should. If they can't cope with it, just imagine what the position of the smaller manufacturer must be.

"One of the minor miracles of this age is that the steel industry, handcuffed by a 1930-style depreciation rate, is still able to produce steel for the sixties on machinery that was obsolete in the forties. The accomplishment is a real tribute to ingenious management as well as to dedicated workers.

"To date, the industry has been able to take advantage of only a few of the new and exciting concepts of producing steel, such as direct reduction of ores, oxygen refining, higher speed, continuous, straightline operations, and electronic and computer controls to produce newer steels that will better fit the needs and demands of the times."

• **Probable Impact** — "A realistic depreciation formula could release such a flood of replacement and modernization activity in the steel industry that the impact would be felt throughout the entire economy. With the help of a realistic writeoff rate, we could produce steel at a lower cost and either absorb rising costs without raising prices—*or possibly even reduce prices.*

"What has happened in West Germany is a classic example of what can be done to build an energetic, modern industrial complex. Its liberal depreciation treatment has enabled it to achieve rapid replacement and expansion. The economy is booming, and there is more work than there are workers.

"The answer to which method produces the better results should be obvious.

"Under present conditions, the steel industry either must have a price increase in the near future or a new depreciation concept, also in the near future. One or the other is needed to assure a healthy steel industry in a strong national economy. One or the other is needed to guarantee our nation a position of dynamic world leadership in steel so we can compete effectively in peacetime as well as be prepared for any possible national emergency."

• **Whose Choice?**—"In the final analysis, the choice rests not with the steel industry but with the federal government.

"This is why we must take the offensive. Large and small companies alike must get the story across to those outside the steel industry who have so much control over our future. We must let our legislators and the public know what our problems are. We must point out to them the consequences of illogical actions. We also must espouse and promulgate positive programs. Our future is at stake. We should act like men who know their stake in that future."

U. S. Steelmakers Plan Mills in Italy and India

U. S. STEEL CORP., Pittsburgh, will participate in a venture to make stainless steel mill products in Italy. Arrangements have been completed to form an Italian company with Terni Societa. The plant is expected to begin operating late in 1963. Sales will be concentrated in the Common Market area.

Jessop Steel Co., Washington, Pa., is developing a "tentative program" for a $5 million joint venture with Vummidiars Private Ltd., Madras, India, to build an alloy steel plant in India. Annual capacity: 7000 to 10,000 tons of finished steel. The plant would initially produce ingots, forgings, flats, and bars. Jessop says the Madras state government "has indicated a willingness to participate in financing the venture."

The Trader's Horn

by S. J. Rundt

Editor's Note: *The Trader's Horn* was originated by Mr. Rundt in 1954, as a labor of love. It first appeared in the Foreign Credit Underwriters' *Exporters' Digest*, continued in the successor magazine, *International Trade Review* (which was taken over by Dun & Bradstreet Inc.), then moved to *Export Trade*. Now to appear monthly in STEEL and STEEL INTERNATIONAL, this column will continue to discuss, straightforwardly, topics bearing upon export trade and direct foreign investment. It will not shy away from provocative or controversial subjects, in the hope that both those agreeing with its stand and those contesting its interpretations may gain from its evaluations.

Dollar Still Vulnerable

The U. S. dollar is still vulnerable—despite its recent improvement in such markets as Amsterdam, Frankfurt, and Paris against the Dutch guilder, the deutsche mark, and the nouveau franc. In fact, whatever the ultimate outcome of U. S. representatives' pleas for support at the recent World Bank-International Monetary Fund (IMF) Conference in Vienna's Hofburg Palace, Washington's efforts to obtain the currency standby backing of such fiscally disciplined, monetaristic nations as The Netherlands, Germany, France, Italy, and Switzerland via the IMF spell a certain intrinsic weakness. We, the spenders (at home and abroad), the budgetary deficit financiers, and the unorthodox, want the Spartans and the orderly ones to assist us. To aid the needy nations (including some rather anti-American "neutralists") in the fashion to which we and they have become accustomed, we must now enlist the assistance of those who, by and large, have been guided by the principles which we have prescribed for all and sundry for so long, but to which we ourselves have never really adhered.

The IMF is running out of funds because those most able to exercise discipline have done so the least in their efforts to help the still less disciplined—mostly youthful, partly autocratic, and often enviable countries. Illiquidity has come with overspending by the most affluent for the benefit of the least solvent. Unfortunately, official U. S. endeavors to inflate the fund to counteract a run on sterling and the dollar (should it develop in the future) come after a year of preachments by us that other nations live within their means and avoid "expansion via inflation." Now the shoe is on the other foot. The estimate for the fiscal 1961-62 U. S. deficit has jumped from $3.7 billion in July to $5.3 billion in September, then to $6 billion, and to $6.5 billion last week. By yearend, we may be lucky to wind up with a deficit of $7 billion, if not more.

Uncle Sam's external payments deficit, on the other hand, will not merely reach $500 million this calendar year—as had been hoped in February—but will come closer to $2 billion, or even $2.5 billion. And after mid-1962, we may be right back where we were in 1958, 1959, and 1960, when our international imbalance was in excess of $3.5 billion each year. The big question: How far shall we endanger the once unrivaled monetary unit of the most potent economy ever developed in history?

Global Glimpses

GERMANY—Only about one-third of current industrial wage hikes can be compensated for by simultaneous increases in manhour productivity. If the trend continues, it should help U. S. shippers now under pressure of keen German competition in third markets.

GREECE—Activities are encouraging. The drachma has been hard, at par for some time. The British sovereign, once the "second" currency in Athens and Saloniki, has lost its luster. The nation's gross national product rose by nearly 9 per cent during the first 1961 semester, a rate likely to persist, and an improvement over last year's growth by 4.4 per cent. Investments are buoyant, as evidenced by a 25 per cent increase in long term loans, a 16 per cent rise in cement use, and a 35 per cent jump in imports of machinery during the first half of 1961 vs. the like 1960 period.

ITALY—The boom persists. Plant output is soaring. Over-all production is running 8.6 per cent ahead of last year's. A 12 per cent increase over the 1960 pace is anticipated by yearend—record growth far greater than all principal industrial countries, except Japan. Steel output so far this year is some 10 per cent above the 1960 rate and will surpass 9 million tons.

NIGERIA—A few doughnut making machines are the latest cry—such a success that more are wanted. Nigeria is one of the most promising markets between the Mediterranean and the Cape of Good Hope.

AUSTRALIA — The recession is drawing to its end. Wool prices are somewhat better. Both trade and payments balances show striking gains. The Commonwealth was able to cancel its $100 million, IMF standby credit, arranged last March. Admittedly, the improved balances are partly due to lower imports. And unemployment remains high. But, generally, the prospects for recovery are now much brighter.

NORWAY—Foreign trade records are being established, with imports running some 9 per cent ahead of last year's.

Outlook Dim for Labor Bargaining

"WE CAN SEE an obvious wave of cynicism (about the future) for collective bargaining," says R. Conrad Cooper, executive vice president-personnel services, U. S. Steel Corp.

He spoke before the annual industrial relations conference of the Associated Industries of Cleveland. Lemuel R. Boulware, retired vice president of General Electric Co., suggested why the cynicism has developed when he pointed out four roadblocks to successful bargaining:

1. The low standing of businessmen with the public. Industry has not sold the free enterprise system, says Mr. Boulware. "The businessman is considered a crook by some," he points out. The businessman must deserve, then achieve, higher standing.

2. The excessive power of union officials. Management hasn't done enough to point this out to the public, believes the former GE executive.

3. Political imbalance. "Unions are the dominant influence on public opinion today," says Mr. Boulware. "Business is inept and ineffective in politics."

4. Bargaining imbalance. Bargaining has to be between equals, he points out—which is not the case in many bargaining situations. "Unions usually get 90 to 95 per cent of what they want. The situation is worsening, not improving," Mr. Boulware fears. "Often, we might as well send a blank check as a vice president into the bargaining table."

Mr. Cooper believes that the power of union officials is the most serious roadblock. In urging action to solve the problem, he says: "Let us each encourage all our associates, particularly the . . . members of unions, to think about whether to let the compulsions of powerful labor union leaders push this country to and beyond the brink of government control, with loss of freedom. I am sure that most union members, including their leaders, do not want this to happen, but it can if they don't do something about it."

Washington lawyer proposes . . .

Walsh-Healey Reform

JAMES R. PATTON JR.

- **Set up an all-industry task force to watchdog Walsh-Healey cases.**
- **Study the impact of W-H minimums on wage rates in industry.**
- **Set up a board (like the Renegotiation Board) to rule on Walsh-Healey cases.**

WITH THE MACHINE tool industry facing a possible $1.75 per hour minimum wage under the Walsh-Healey Act, industry in general is showing alarm.

The Walsh-Healey Act, passed in 1936, empowers the secretary of labor to set the minimum wage for production employees in any company working on government contracts worth $10,000 or more. Secretary Arthur Goldberg has picked up the W-H banner and appears bent on reviewing wages in a host of metalworking industries — see Windows of Washington, Page 80.

Industry's basic complaint: "Minimum wage determinations are 95 per cent politics, 5 per cent logic." Representatives of the machine tool, electronics equipment, business forms, and paper industries meeting in Washington under the auspices of the National Chamber of Commerce cited these factors in recent determinations:

1. Minimum wage surveys were taken during depressed periods when lower paid workers were laid off.

2. Calculations tend to overlook wage differentials between large and small firms and between regions.

3. Minimums tend to affect all workers rather than only the lowest paid.

4. Surveys overlook technological advances in competitive industries.

5. Definitions of employees covered are not adequate. The status of employees like blueprint machine operators and apprentices is not clear.

• **Strategy** — At the Washington meeting, three possible avenues of action were discussed: 1. Industry could adopt a policy of nonco-operation in the wage determination procedures in the hope of focusing attention on the problem. 2. A campaign to repeal the Walsh-Healey Act could be started. 3. Bipartisan support could be sought to bring about changes in Walsh-Healey proceedings.

James R. Patton Jr., who is with Covington & Burlington, Washington counsel for the National Machine Tool Builders' Association, suggests a three part program. (See exhibit above.)

Mr. Patton also recommends a watchdog group from industry that would include at least one lawyer and one economist who would familiarize themselves with all cases. A backlog of information would be built up and provide the needed "continuum" of knowledge that's now lacking.

Mr. Patton's third proposal is to set up a ruling board. The action would remove the labor secretary from his decision making role.

More Walsh-Healey Surveys Coming

IF YOUR INDUSTRY hasn't experienced a Walsh-Healey minimum wage determination (see table), the chances are good that one is in the works. In the eight months Arthur Goldberg has been secretary of labor, he has pushed hard to expedite the program and now has these metalworking industries scheduled for determinations:

Machine tools, motors and generators, pumps and compressors, scientific instruments, engines and turbines, electric lamps, conveyors, electronic equipment.

A prior determination doesn't keep you from being the object of further studies by the Wage & Hour Division of the Labor Department. You could be hit with a new ruling.

● **Speedup**—Furthermore, the secretary has just announced a speedup of the involved proceedings that precede a ruling. In the past, it has taken two to three years, sometimes four, from the time an industry is surveyed by the Bureau of Labor Statistics to the time the secretary issues his determination. New procedures are expected to cut the gap to less than one year. Tactics include:

1. Shortening the time taken to prepare questionnaires, collect and tabulate the data. 2. Once the public hearing is concluded, the industry will have only 30 days to file a brief supporting its hearing presentation. 3. After a tentative determination is published in the *Federal Register*, the industry will have only 21 days to file further comments. 4. After a final determination is published in the *Federal Register*, it will automatically become effective within seven days unless the secretary thinks evidence introduced during the hearings makes such action inappropriate. 5. Any requests for postponements of conferences or hearings will be rejected "in the absence of exceptional circumstances."

● **Harassment?**—The Walsh-Healey Public Contracts Act applies to workers on government supply contracts worth more than $10,000. Passed in 1936 to combat sweat shop practices when wages were tending to drop, the act has become a tool for enforcing a minimum wage above the national minimum of $1.15 an hour in some industries.

Representatives of the machine tool industry pose this question too:

Much of the labor secretary's emphasis seems to be on the capital goods producers. "If we're facing a wage hike, it certainly means possible price increases in equipment."

Walsh-Healey Minimums

Industry	When Started	Last Revised	Hourly Minimum
Aircraft	1942	1961	$1.15
Lead-Acid Storage Battery	1957	1957	1.38
Dry Primary Battery	1957	1961	1.15
Other Battery	1957	1957	1.34
Diecasting	1941	1961	1.15
Electric Lamp	1956	1956	1.26
Electronic Parts	1961	1961	1.23
Solid-State Semiconductor Devices	1961	1961	1.35
Electron Tubes	1961	1961	1.42
Fireworks	1938	1961	1.15
Metal Furniture	1939	1961	1.15
Iron & Steel	1940	1961	1.15
Metal Business Furniture, Storage Equipment	1954	1961	1.43
Office Machines	1956	1961	1.15
Photographic & Blueprinting Equipment	1939	1961	1.52
Scientific, Industrial & Laboratory Instruments	1941	1958	1.20
Small Arms Ammunition	1939	1961	1.15
Explosives	1939	1952	1.20
Blasting, Detonating Caps	1939	1961	1.15
Surgical Instruments, Apparatus	1941	1958	1.25

Lawyers familiar with Walsh-Healey determinations figure the speedup Secretary Goldberg is sponsoring amounts to harassment of industry, designed to curry favor with labor at a time when the White House's public policy is to hold the line on prices—see Page 79. Commented one lawyer: The situation's bound to get worse. It's already like a criminal trial which lacks full due process of law because hearings are conducted in a prejudged atmosphere.

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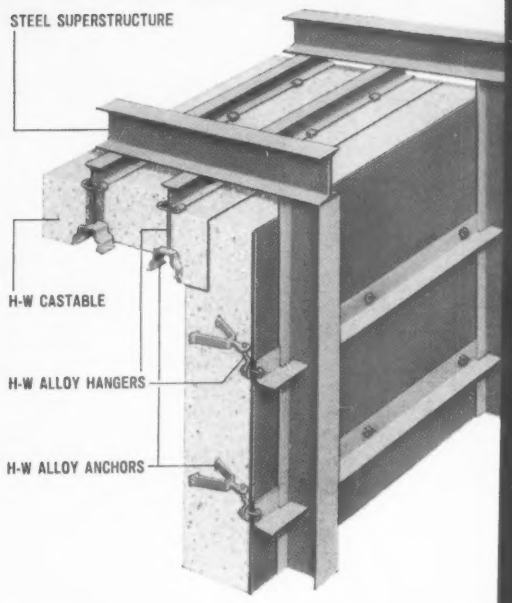

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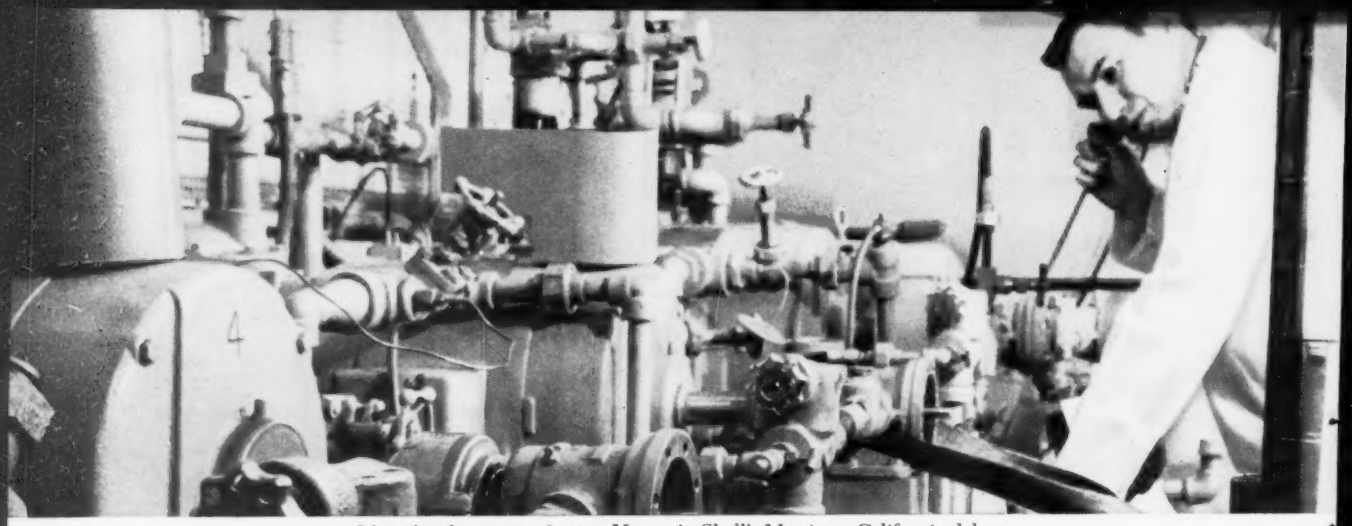

Listening for pump chatter. Here—in Shell's Martinez, California, laboratory Shell Tellus hydraulic oils are subjected to the most demanding tests.

BULLETIN:

Shell presents a question-answer guide to help you select the hydraulic oils for top performance

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3. Does it fight rust and corrosion? It is difficult to exclude all moisture from a hydraulic system. And moisture can form troublesome rust. Shell Tellus Oils have been carefully compounded to resist corrosion.

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Market For Profit Growth

No. 1

New Marketing from New Products

When Raytheon Co., Lexington, Mass., redesigned and re-engineered its precision welding machine, it ended up with far more than a new product. It revamped its whole method of marketing the unit, as a result of thoroughly "rethinking" the device.

It revitalized marketing with these approaches:

1. It shifted from a functional to the product manager approach, which was needed especially for technical products.

2. It put welding specialists in the field, instead of generalists who handled other Raytheon products.

3. It added manufacturers' representatives to get broader coverage.

4. It added more technical sales help.

Simple?

Yes, says Stuart D. Cowan, vice president-commercial marketing and international services. "But we need more common sense in marketing. Our rethinking of this problem made us realize we had drifted into unnecessary complexities in our marketing. It re-emphasized that we need to do the simple things well."

Doing simple things well enabled Raytheon to cut its sales costs on the welder by 11 per cent even though it added sales personnel.

"A MARKET is like a woman—difficult to understand, hard to get along with, but very rewarding if approached correctly."

That's what Stuart D. Cowan of Raytheon Co. told the National Industrial Conference Board's marketing conference last month. One correct approach is through new products that meet new conditions.

Arno H. Johnson, vice president of the advertising agency, J. Walter Thompson Co., listed some of the major new conditions to expect:

- A population of 223 million by 1972 vs. 184.5 million now. That's equivalent to adding a metropolitan market the size of Detroit every year over the next decade. Among other things, that means we'll be needing greater quantities and more types of consumer goods.

- As of now, 61 per cent of all families of two or more related persons have children under 18 in the home. Families with two or more children have increased three times as fast as the total growth in families In particular, that's putting more pressure on housing since many homes have only one bathroom, or not

New Product Makes New Customers in Established Market

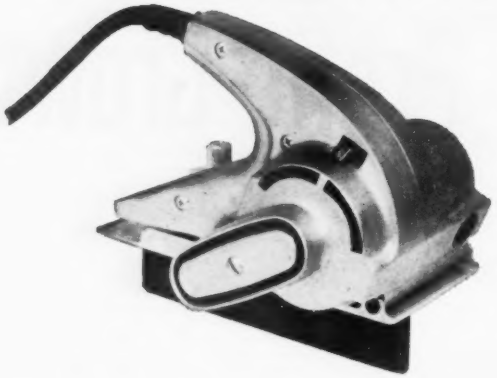
How often have you seen a carpenter slowly fitting a door with a hand block plane?

Have you ever considered an electric block plane?

The sales training manager at Rockwell Mfg. Co.'s Power Tool Div., Pittsburgh, did and asked why the company didn't make it. "We hadn't given the matter much attention," recalls E. Lawrence Tabat, the division's vice president-marketing. "The hand block plane had been around so long that we took it for granted. Our customers were apparently in the same situation because they had expressed no particular demand for an electric unit."

RESULT: The division built one. When marketing began, Mr. Tabat expected that perhaps 10 per cent of the division's 6500 dealers would take it. All but 100 wanted it. Sales have run more than 300 per cent above the original forecast.

MORAL: It takes creative imagination, which can come from any source, to sense what the market needs. Not many customers are articulate about what they want, but when they see the right product, they recognize its worth and buy it.



enough bedrooms.

• The next decade will be characterized by a 43 per cent increase in the family forming age group of 20 to 29 and by a 30 per cent gain in the adolescent group of 10 to 19. New families need appliances, autos, and a host of other household items. The adolescents are just beginning to buy—clothes, toys, food.

• Within the next five years, the equivalent of our entire civilian population over the age of 1 will change its residence. That too stimulates demand, especially for housing, transportation, and construction generally.

• Between 1950 and 1960, population in the suburban portion of 199 metropolitan areas grew 61 per cent, while the central cities grew only 1 per cent. The rest of nonmetropolitan U. S. increased 7 per cent. The shifts have stimulated and will continue to stimulate the demand for housing, roads, shopping centers, and other urban facilities.

• By 1971, the probable 71 million high school graduates in our adult population will represent 55 per cent of the total persons 20 years and over—a gain of 35 per cent over the 1961 figure. The adult population will grow 13 per cent in the period. Total college graduates increased from 3.9 million in 1940 to 8.4 million in 1961, and by 1971 they should total 11.2 million, nearly three times the number in 1940. Such developments will bring about demands for higher quality and for different kinds of products. (For example, sociologists attribute part of the growth in participating sports at the expense of spectator sports to higher educational levels.)

Mr. Johnson sums up: "The U. S. has definitely entered a consumption-oriented economy (in which) more and more emphasis is being directed to improvement in living standards . . . They could be vastly upgraded for the mass of the population without being excessively luxurious."

Meaning for Metalworking

Need metalworking do more than settle back and reap the harvest of the coming bigger markets? Yes. Industry has a big marketing job to do—to appeal to that fickle woman.

Metals are getting rugged competition from many nonmetallics. All major metals except aluminum have lost ground (on a per capita consumption basis) since 1950. Most nonmetallics have gained.

From 1950 through 1955, durable goods got an average of 33.3 per cent of the consumers' discretionary outlays. But during the 1956-59 period, the figure fell to 30.6 per cent.

Makers of industrial machinery have watched their share of the dollar (and of profits) slip too. Since World War II, investment in producers' durable equipment has averaged 6.3 per cent of the gross national product. In the last three years, it averaged only 5.4 per cent.

During the 1951-57 period, metalworking sales averaged 31.3 per cent of GNP. The average in 1958-

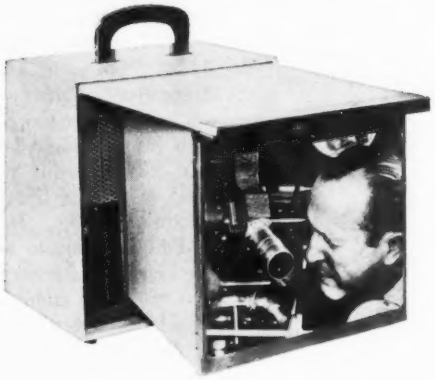
Established Product Becomes New in New Market

In 1960, Fairchild Camera & Instrument Corp., Syosset, N. Y., introduced an 8 mm motion picture and sound projector for home use. The company soon saw that the product also had industrial and educational applications, reports R. G. Hennessey, general manager of the Industrial Products Div.

Preliminary testing revealed that the unit was satisfactory for home use, but it had disadvantages in the other markets. First, its weight made it unwieldy for commercial use. Second, the home unit was designed for a semidarkened room—a condition that was not always easy to get in offices or classrooms. Third, the noise made by the device was considered objectionable by industrialists and teachers, although it was no handicap in home sales.

RESULT: The home unit had to be redesigned for commercial applications, and a truly new product was born.

MORAL: A product suitable for one market is seldom precisely right for another. Fashion your product for its use, but be sure you know exactly what the use is.



60 was 28.9 per cent. Had we maintained the earlier ratio, metalworking would have sold an additional $10 billion of products in the last three years—and earned profits on them.

The consulting firm of Booz, Allen & Hamilton predicts: "In the next three years, about 75 per cent of the nation's growth in sales volume can be expected to come from new products." It's already "commonplace" for a firm to have 50 per cent or more of current sales in products that were developed within the last decade.

What kinds of new products should we expect?

• **In Metals**—Thomas T. Fleming, vice president - marketing, Howe Sound Co., sees a marked trend in all metals to alloys for more tailored applications. He predicts more combination materials — aluminum plus steel, aluminum plus plastics, and other clad forms. Less metal will do more work (thin tin plate is a recent example in steel). New fabrication techniques (such as gains in investment castings) will make new metal products possible.

Mr. Fleming believes metals like molybdenum, beryllium, and titanium have great potential. He predicts more metals companies will deal in more than one material. Other observers believe metals companies will get more into end products to stimulate demand for their materials. They may make the new product themselves or license its manufacture. U. S. Steel Corp. and others involved in the development of SteelFast, a metal channel used to fasten dry wall panels, took the license route.

• **Equipment**—Lester M. Cole, vice president-sales for Warner & Swasey Co., believes the capital equipment makers who do best in the future will be those who develop new products to:

1. **Do nonproductive jobs better.** The potential is big for equipment that improves material handling, performs testing more efficiently, does more and better packaging.
2. **Do more clerical jobs better.** Besides the computer, the more standard office machines offer great promise. One example: A voice operated typewriter is now technically feasible.
3. **Do short run production more efficiently.** The most spectacular technological breakthroughs thus far have come in machinery for long runs. We need more good short run tools. Automotive producers have some, particularly in their stamping operations. They make a greater number of auto models possible.
4. **Do miniaturization work better.** The trend is here. The limiting factor is production machinery.
5. **Do old jobs in new ways.** For example, you can cut virtually any material with water sprays that reach pressures of 90,000 psi; 150,000 psi is in the offing.

• **In Construction** — George Cline Smith, partner in MacKay-Shields Associates, told the Conference Board's marketing session that "in terms of today's dollars, new con-

struction, plus maintenance and repair work, will absorb well over $1 trillion in goods and services during the 1960s. But this will not automatically mean satisfactory profits for everyone. The postwar Garden of Eden in which the industry operated has ceased to exist."

Fierce competition, rising costs, and other factors have cut the profit levels in construction. For those reasons, Mr. Smith forecasts increased emphasis on technological developments in building. He and others predict a demand for even more prefabrication techniques. Many companies can cash in by meeting that market need.

For example, U. S. Steel has high hopes for an exterior door. A steel door costs more than its wood counterpart, but the metal unit doesn't require refitting as do the wood types, so the end cost is less. Republic Steel Corp. has developed a knockdown steel door frame which can take a steel or wood door. It also minimizes the costly refitting problem. Vinyl coated steel has a big potential as interior paneling because the finish is installed at the factory, eliminating expensive on-the-job work.

• **In Consumer Goods**—George H. Struthers, vice president-merchandising for Sears, Roebuck & Co., reports that half the company's 1961 merchandise was not in its catalogs before 1950. Some of the post-1950 items include dishwashers, electric frying pans, dehumidifiers.

Here are a few products he predicts Sears will be selling in the next decade: TV tubes positioned on the walls of our homes, wireless stereo, and fuel cells for appliances.

Other developments in consumer products are not even as blue sky as those. For example, Aluminum Co. of America is co-operating with the woodworking and plastics industries to combat the destructive forces of some of the less formal parties in hotelrooms. Tables and desks now have wood veneer tops soaked with resin to prevent alcohol staining, and they are backed with aluminum foil to prevent cigaret burns by taking away the heat. Some Alcoa customers are using vinyl coated aluminum to make luggage and typewriter cases that are easy to carry, durable, and good looking.

Marketing & New Products

The foregoing gives you an idea of the opportunities in new products. Yet how do you dream them up?

Booz, Allen & Hamilton states: "The evolution of new products is a concrete business function, not an abstract mystery. (It) can be described best as a management process." Details of how to manage for new products were given in the 14th in this series, July 17, p. 81. The rest of this article will deal with marketing's role in new product development. The next in the program, Oct. 23, will concentrate on marketing's part in selling new and established products.

The closer the company is to consumer goods, the shorter the cycle of its products. As the product is closer to basic industry or producers' goods, the longer the cycle. But sooner or later every product gets displaced or gets involved in profitless price fighting. The time scale on almost all products is being more and more compressed by accelerating research and technology, by changing markets, mass media, and mass distribution.

It's impossible to work up a master blueprint that will direct every company unerringly to a successful new product. Yet a few ground rules can help:

1. Foster the right climate. Top management should spearhead the drive for new products. Robert R. Kelly, executive vice president of Seeburg Corp., points out that only the chief executive officer can give the final word on budgets and determine what money goes where. Many product failures, he believes, can be traced to top management's failure to give direction.

2. Make one person responsible for product development. At the Conference Board's marketing meeting, the consensus was that the individual should be a marketing man. The speakers were unanimous in believing that he should at least have some marketing experience. Raytheon's Mr. Cowan said that some of his company's product development problems stemmed from engineers having too much to sav. (That's no longer the case.) E. Lawrence Tabat, of Rockwell Mfg. Co.'s Power Tool Div., thinks "engineers tend to consider themselves marketing experts and may guess wrong on what the customer wants." Marketing is of paramount importance because new products should be developed on the basis of what the customer needs, not on what the manufacturer wants to make.

3. Keep the new product team small. If it's not led by a marketer, it should certainly have marketing representation. The team should report directly to the president or other top officer and should be composed of people from marketing, engineering, and production as the nucleus. Other specialties can be added when the need for them arises. That's the course followed by S. C. Johnson & Son Inc., the Racine, Wis., wax firm. Varied membership helps break down barriers among various departments.

4. Test, test, test your product ideas. Fairchild Camera's R. G. Hennessey points out that test panels tend to be too polite, flattering you into freezing designs too soon. Mr. Cowan adds that inadequate field testing is the cause of many product failures. Initial testing on a Fairchild movie and sound projector revealed it was too heavy and too noisy for commercial use. The problems were solved with later prototypes, but further tests revealed the need for a windup reel for the electrical cord.

A market is like a woman. The secret of approaching her correctly is to supply her every need, often before she consciously knows what she wants herself. Do that, and the rewards will be great.

PLAN FOR PROFIT GROWTH

Market for Profit Growth II

On Oct. 23, STEEL will discuss some of the newer marketing techniques to help you do a better job of selling your products. For a free copy of any or all articles in this series (appearing biweekly since Jan. 16), write: Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.

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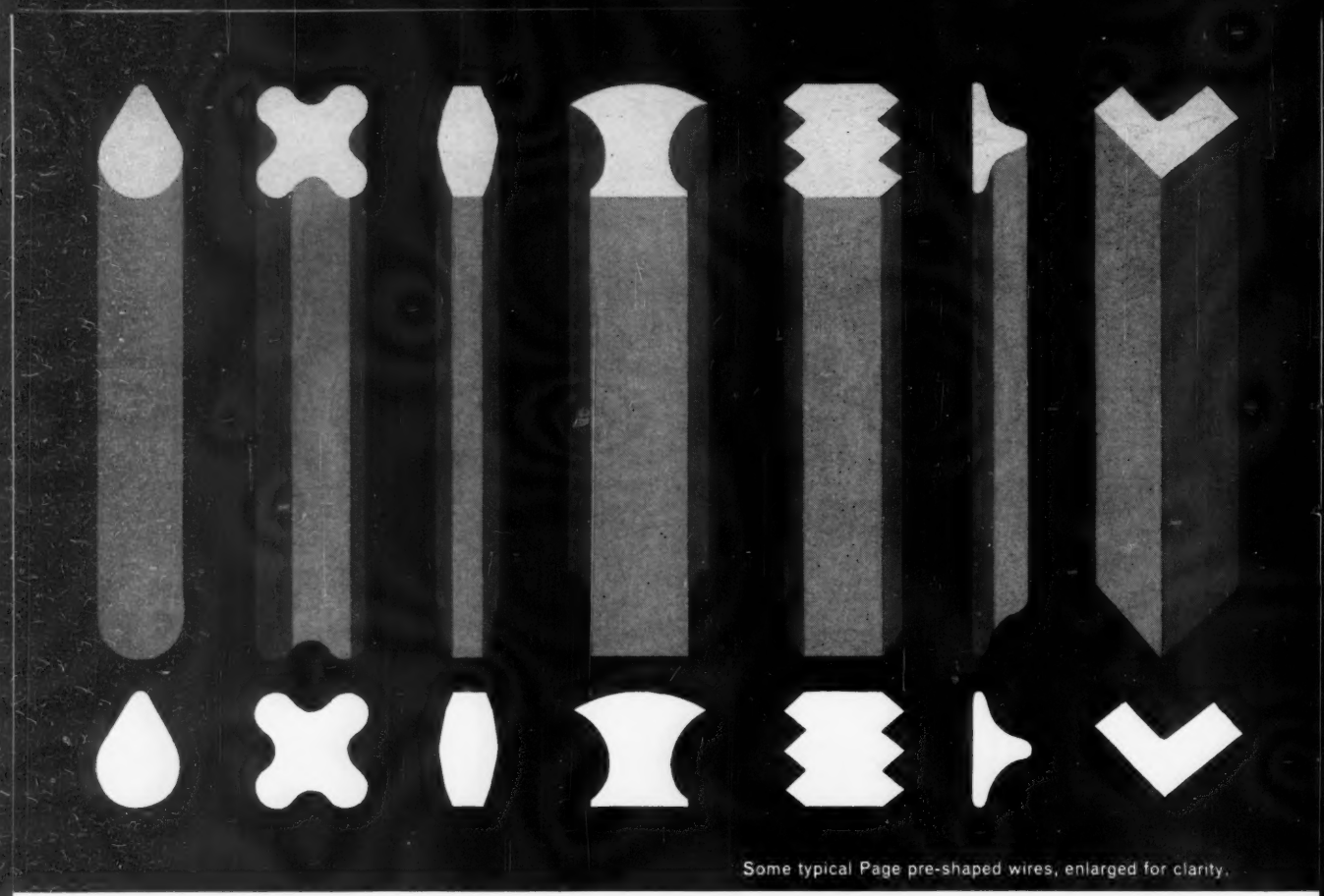

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GM Bets on Chevy II to Catch Falcon

CHEVROLET has boxed itself into a pricing corner this year—it has two compacts, Corvair and Chevy II, which apparently will compete with each other, as well as with Ford's Falcon and Plymouth's Valiant.

It is obvious that the Corvair has never successfully competed with the Falcon. Last year, Ford built and sold half a million of the compacts. Corvair's output was about half that amount. It probably would have been worse if the division hadn't introduced its Monza series. While regular Chevrolets are outselling standard Fords almost 2 to 1 this year, the Corvair is 100,000 units behind the Falcon.

Earlier in the year when it became known that the Chevy II would be aimed at the Falcon, it was believed that the GM division would limit its rear engine Corvair to the higher priced Monza series. Chevrolet has pointed out that it thinks 1962 Corvairs will appeal to the sports minded buyers. It figures Chevy II will be purchased by economy minded prospects.

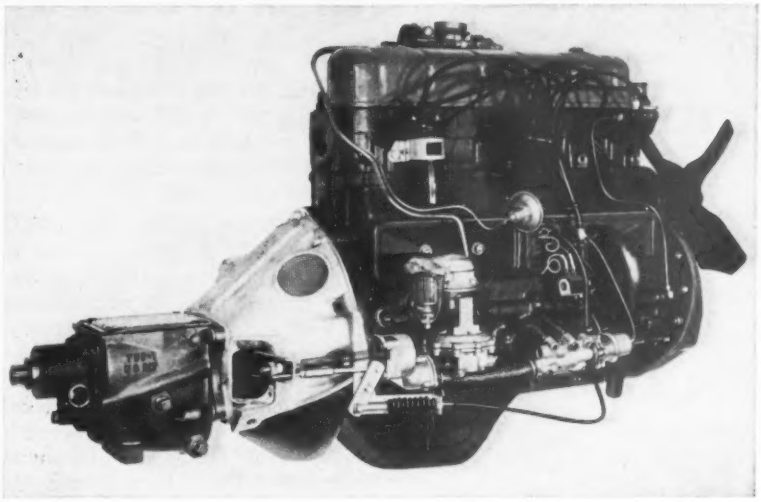
• **Prices** — But price comparisons don't bear that out. The Corvair four door sedan and the station wagon have been dropped, but the other models match most of Chevy II's offerings. The least expensive Corvair carries a price of $1992 in Detroit. The comparable Chevy II costs $2003. Falcon's two door sedan lists for $1985.

Factory list prices are even closer. They put the new Chevrolet series within $10 of Corvair for most models. The Chevy II is 3 in. longer than the Corvair. Its dimensions are almost identical to the Falcon's. Sales forecast calls for 400,000 Chevy IIs and 200,000 Corvairs.

Industry speculation: If the Corvair competes too strongly with the Chevy II, the older compact will be dropped, or at least sliced down to a single series. Edward N. Cole, Chevrolet's general manager, doubts that there is an adequate market for a domestically built car smaller than the Corvair. But engineers admit that many of Corvair's body parts could be adapted to a smaller car. The thought prompts a question: If Ford's forthcoming Cardinal is successful, will Chevrolet bring out its own version and call it Corvair? The GM division has refused to answer.

• **Other Prices Hold** — Elsewhere, you'll find that prices are little changed from last year's. Ford and GM have made the heater standard equipment on all lines.

Chrysler Corp. has not included heaters as standard equipment, but



How AMC's E-Stick Works

THIS SHIFT (available only on the Rambler American) provides the economy of a manual transmission with much of the convenience of an automatic shift at one-third the cost. It's really an automatic clutch, but unlike electrically or vacuum operated clutches of similar design, the unit operates hydraulically, using the engine's oil system. No special hydraulic system is needed, although the oil pump is heavy duty to provide more pressure.

The E-Stick (E for "Easy") has a conventional disc and pressure plate, but the clutch levers are arranged to engage it instead of release it as in a regular pedal operated clutch. Since it's not spring loaded, there are no thrust rings or centrifugal weights. Those features make for a lighter design and simpler construction.

There's no clutch pedal. To shift, you simply move the gear shift lever through the regular shifting pattern.

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it cut prices an average of 1.8 per cent. For the first time in years, some of the Chrysler cars will cost less than competitive makes. Take a look at Plymouth's V-8 Fury in the four door hardtop. Even after adding a heater, it costs $2580, compared with $2599 and $2595 for similar Ford Galaxie and Chevrolet Impala jobs. Remember that those are factory list prices. By the time you've added an automatic transmission, power steering, brakes, and a radio, the price goes up another $400. Tack on another $300 for federal excise tax and dealer handling, and you are in the $3300 bracket. And that doesn't include transportation charges, state and local taxes.

• **Lark Increases** — Studebaker-Packard Corp. has raised prices in all but two categories. The exceptions: Two door sedans and hardtops. The sedans were reduced $1. The hardtops have been cut $25. Other models are up an average of $30. The action puts the lowest priced Larks ($1853) into more direct competition with the Falcon, Lancer, and Chevy.

In some cases, however, the Lark seems to be competing out of its class. Its lowest price Regal convertible ($2360) is only $3 cheaper than the Buick Special soft top, although the car is 4 in. shorter. The Lark really is closer to Chevy II in size, but it lists for $100 more, without a heater.

While S-P has increased prices, American Motors Corp. has instituted reductions on all but its American de luxe model. Direct comparisons are difficult to make since the company has upgraded each of its series, but it appears that the average decrease will be $250

• **Luxuries Steady**—Prices of the top three luxury cars have held. Chrysler's Imperial starts at $4481 and ranges to $5870. Cadillac's factory list scale spreads from $4594 to $9116 for its limousine. The TW Lincoln Continental models list at $5565 for the sedan, $6166 for the convertible.

Common accessories like automatic transmissions, power steering, power brakes, and radios generally are unchanged from last year's on all industry lines. STEEL's annual specification and pricing sheet for comparison shopping will be published in the Oct. 23 issue.

U. S. Auto Output

Passenger Only

	1961	1960
January	415,857	688,690
February	364,385	659,298
March	407,959	654,241
April	446,739	582,869
May	542,303	611,260
June	599,474	613,136
July	399,191	434,377
August	195,266	305,514
September	345,000†	407,691
9 Mo. Totals	3,716,174†	4,957,076
October	.....	617,972
November	.....	597,638
December	.....	523,422
Total	.....	6,696,108
Week Ended	**1961**	**1960**
Sept. 2	90,983	51,647
Sept. 9	83,421	52,635
Sept. 16	64,164	85,879
Sept. 23	73,034	120,722
Sept. 30	107,240†	134,118
Oct. 7	110,000*	140,832

Source: *Ward's Automotive Reports.*
†Preliminary. *Estimated by STEEL.

Telephone Firm Develops Improved Auto Undercoating

MICHIGAN Bell Telephone Co. has come up with a $30, antirust coating that it believes will cut maintenance costs and add to the useful life of its fleet vehicles.

This AT&T subsidiary has a 4600 vehicle fleet. About 75 per cent of them are light installation trucks. The fleet averages 46 million miles a year and corrosion maintenance and repair costs the company $80,000 annually, says Gilbert H. Selke, superintendent of motor equipment. Since most of the vehicles have specially built bodies, the telephone company tries to keep its cars for six years, trucks for seven before replacing them, but Mr. Selke admits that corrosion problems have made this a tough proposition.

After trying all available rustproofing systems, the company found that a grease used to prevent corrosion in underground piping works equally well on cars and trucks. The grease is cut with a water soluble solvent and sprayed into corners and interior sections of frame channels, doors, and other underbody parts where moisture collects. The grease has a capillary action, so it creeps into minute crevices where rust starts.

To reach inside sections of the body, 18 holes are drilled in inconspicuous places. They are plugged with plastic caps after spraying. Four different consistencies of grease are used, depending on the area to be coated. The grease forms a pliable film, so it can't be chipped off or washed away, although Mr. Selke admits it softens in extremely hot weather.

The coatings have been in use for two years. Mr. Selke agrees that it's too early to tell whether the compound will last for the life of each vehicle. But he says it has virtually eliminated rust on cars and trucks where it has been properly applied. It may be necessary to degrease and recoat the vehicles after three or four years.

Standard industrial compressors and spray guns with special nozzles are used to apply the grease. The equipment costs about $3000. Bell has subcontracted the work to several firms that will probably be making it available for private car owners. Other AT&T subsidiaries whose fleets are exposed to severe corrosion problems are investigating the method.

Mr. Selke does not charge that the auto companies do an inadequate rust prevention job. He says his fleet needs additional protection. The system appears to be too expensive to be used by automakers. It's needed mainly in areas where salt or brine are used for snow removal.

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Feed Stuff, Mineral Feed
Fertilizer • Food
Foundry • Glass
Insecticide and Fungicide
Laundry • Leather
Lithographing
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Lubricant • Match
Metallurgical • Metal Working
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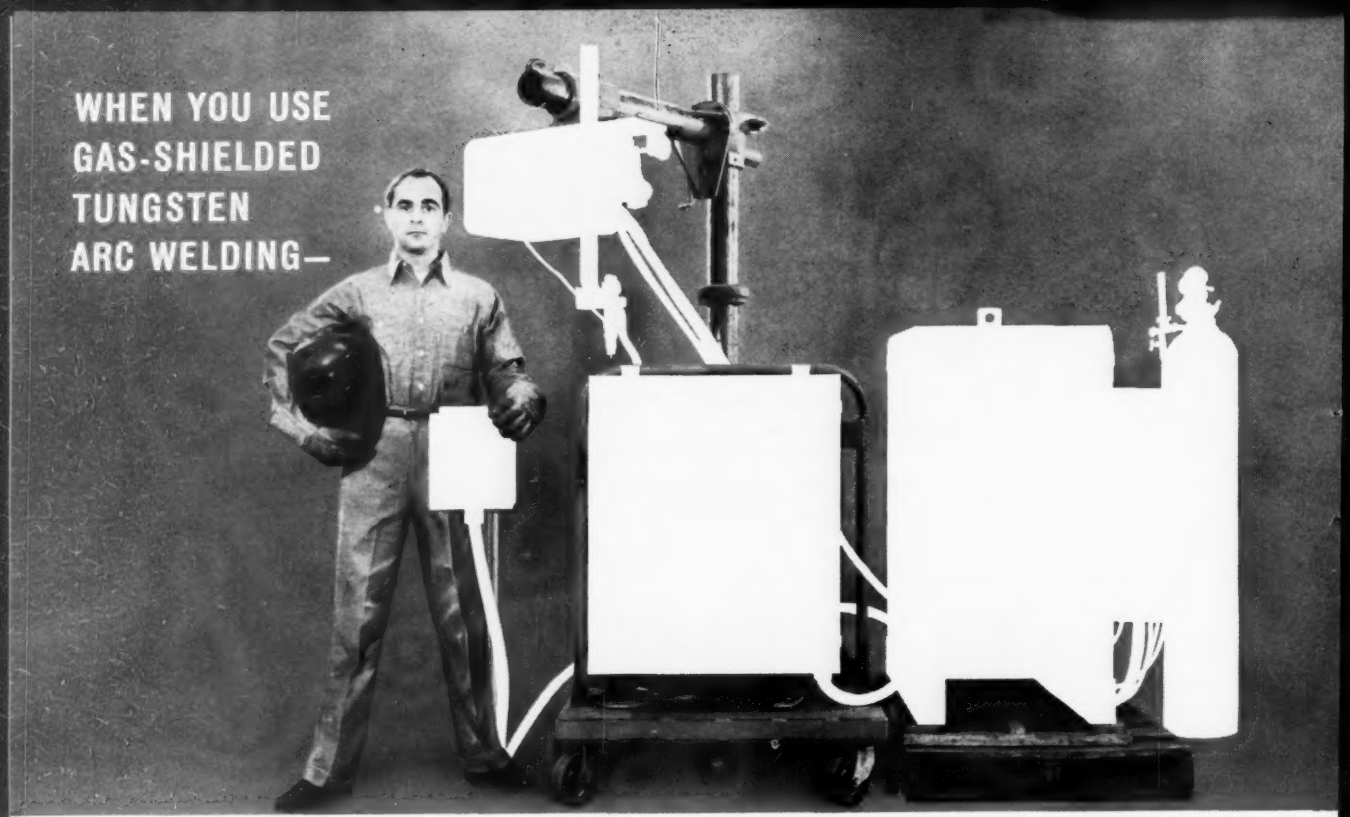

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New Orders Assure Continued Uptrend

THE INFLUX of new orders is the strongest it has been for many months. It accounts for at least a part of the growing optimism about the continued upturn in the fourth quarter and beyond.

For example, 58 per cent of the buyers reporting in the September survey of the National Association of Purchasing Agents said orders were better then they were a month earlier—one of the highest percentages recorded in the last ten years. Only 6 per cent said they were lower—the lowest percentage so reporting since April, 1955. In addition, the increase in the "better" category (from 37 per cent in August) has been matched only twice in the last ten years.

Production is not far behind. Fifty-one per cent of the buyers reported output increased in September, the highest percentage since May, 1959, and 2 points over the August report.

● **Bigger Picture**—On the basis of the NAPA report, it is likely that the Commerce Department's figures for new orders and sales in September will continue the strong uptrend prevailing since February. Latest data show that seasonally adjusted new orders jumped nearly 4 per cent in August to $15.56 billion, the highest level since June, 1959. Since the recession low for new orders in January, they have climbed a little over 20 per cent. At the same time, sales (synonymous with production) have jumped from a seasonally adjusted $13.17 billion to $15.19 billion, or about 15 per cent.

Among the major categories in durable goods, only the transportation group lost ground on incoming business in August, probably a reflection of the early model changeover in the auto industry.

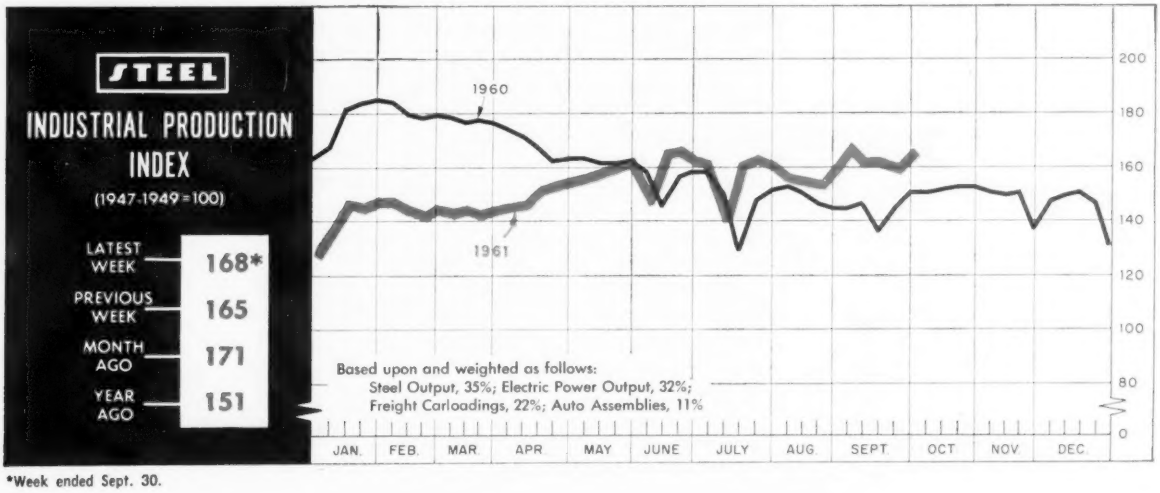
● **Fourth Quarter Outlook** — The new order situation prompted the Business Survey Committee of NAPA to observe: "Recovery from the 1960-61 recession is now an accomplished fact; the hoped for better third quarter is a reality; and the anticipated good fourth quarter seems to be in the making." The committee cited four more factors as evidence of strengthening business:

1. One-fifth of the members reported higher prices last month. It was the highest percentage since April, 1960. (However, the bulk—74 per cent—still reported stability.)
2. Inventory liquidation seemed to have bottomed out; a small amount of accumulation was reported.
3. Increased employment was reported by 34 per cent, the highest total since the presteel strike months of 1959.
4. Leadtimes were extending, slowly but surely, with expectations of further lengthening in the next few months.

Consumer Still Question Mark

How much of this growing strength is the result of rising consumer demand for end products? That's one of the most puzzling questions of the day. Much has been made of the apparent lack of steam in personal consumption expenditures. On the other hand, merchants reportedly are stocking up for what is expected to be the biggest shopping spree ever for Christmas.

The latest consumer attitude survey made by the Survey Research Center at the University of Michigan (see STEEL, Oct. 2, p. 26) indicates that confidence is returning to this sector. Some of it may have



*Week ended Sept. 30.

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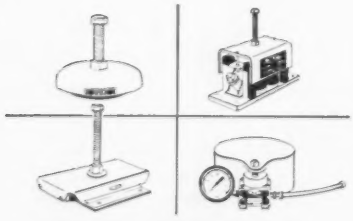

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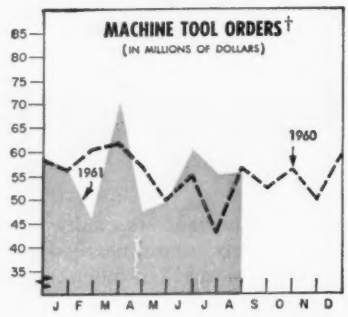
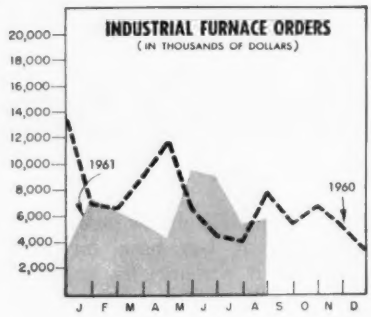




	New Orders (000 omitted) 1961	New Orders (000 omitted) 1960	Shipments (000 omitted) 1961	Shipments (000 omitted) 1960
Jan.	$56,100	$56,450	$45,500	$46,400
Feb.	46,400	60,600	45,650	51,950
Mar.	70,050	61,950	54,850	64,500
Apr.	47,650	51,850	53,700	55,100
May	49,600	49,950	57,900	56,350
June	60,500	55,100	64,200	63,100
July	55,650	42,950	49,750	51,300
Aug.	56,000*	56,850	47,950*	47,900
Sept.	.....	52,300	.....	53,950
Oct.	.....	56,200	.....	51,350
Nov.	.....	49,950	.....	48,550
Dec.	.....	59,000	.....	61,350
Totals	.....	$653,150	.....	$651,800

†Cutting and forming. *Preliminary.
National Machine Tool Builders' Assn.
Charts copyright, 1961, STEEL.

	1961	1960	1959
Jan.	7,291	6,827	4,545
Feb.	6,468	6,499	3,596
Mar.	5,535	9,033	7,842
Apr.	4,113	11,687	14,517
May	9,653	6,352	5,315
June	9,194	4,245	8,230
July	5,390	3,966	13,141
Aug.	5,759	7,840	9,738
Sept.	....	5,253	5,560
Oct.	....	6,634	12,867
Nov.	....	5,084	8,442
Dec.	....	3,248	13,437

Industrial Heating Equipment Assn. Inc.

shown up late in September when department store sales (as reported by the Federal Reserve Board) moved ahead of the year-ago weeks. (See Barometers of Business, Page 95.) However, one week does not make a trend in this erratic indicator. If it continues well into October, it probably can be regarded as a solid plus factor.

But Dun & Bradstreet Inc. backs up the Fed's figures with the report that retail volume in the week ended Sept. 25 "staged a fall comeback . . . and climbed above the similar period a year ago." Sales of appliances, particularly laundry equipment and television sets, led the durable goods.

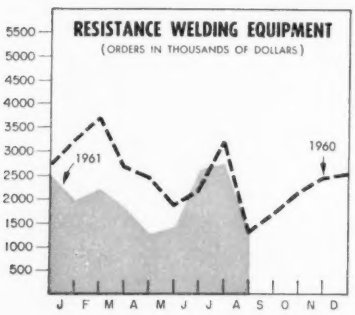
Many observers say there really isn't anything wrong with the way the consumer is behaving. They claim the pattern of his spending has changed and that the traditional methods of measuring expenditures are outmoded. Two features stand out: 1. Services consume considerably more of the individual's income than ever before. During the second quarter, services accounted for 41.7 per cent of personal consumption expenditures, while durables accounted for 12.5 per cent. A year earlier, services were 40.5 per cent of the total, durables 13.2 per cent. 2. Discount stores have brought about a revolution in retail merchandising which so far defies quantitative analysis. Many observers feel that the public buys more today than ever before, but at discount prices, the dollar totals don't reflect it.

It can hardly be disputed that the consumer is in a pretty solvent condition. Even without the special government life insurance dividends in March and July, personal income has advanced each month since March. It reached a seasonally adjusted annual rate of $419.3 billion in August, 4 per cent above the recession low point. At latest count, personal savings totaled $25.8 billion, up $3.1 billion over the figure only six months before.

As one economist remarked: "We know the figures, and we think we know the reasons, but that doesn't alter the fact that spending hasn't responded as it did in other recovery periods. And unless it does pretty soon, this is going to be a sick recovery."

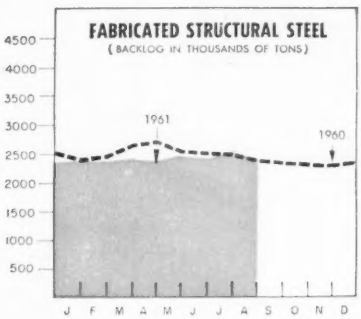
Production Index Rises

A greater than expected decline in electricity consumption more than canceled moderate gains in steel-



	Net Orders		Shipments	
	1961	1960	1961	1960
Jan.	2,013	3,258	1,731	1,582
Feb.	2,236	3,732	1,916	2,563
Mar.	1,871	2,653	2,739	3,011
Apr.	1,322	2,446	2,613	2,943
May	1,464	1,871	2,318	2,310
June	2,670	2,205	2,734	3,267
July	2,744	3,244	2,787	2,221
Aug.	1,308	1,330	1,753	2,528
Sept.	....	1,689	....	2,559
Oct.	....	2,145	....	2,328
Nov.	....	2,457	....	1,927
Dec.	....	2,525	....	1,974
Totals	....	28,933	....	29,218

Resistance Welder Manufacturers' Assn.



	Shipments		Backlogs	
	1961	1960	1961	1960
Jan.	261.6	235.1	2,371.2	2,390.5
Feb.	260.2	270.9	2,357.4	2,473.8
Mar.	292.4	311.6	2,392.1	2,671.8
Apr.	318.7	322.7	2,377.5	2,713.4
May	365.0	320.1	2,457.8	2,528.2
June	361.2	374.2	2,414.7	2,507.5
July	286.9	338.9	2,517.1	2,489.8
Aug.	359.5	373.4	2,377.5	2,389.1
Sept.	....	363.9	.....	2,325.6
Oct.	....	352.8	.....	2,291.4
Nov.	....	324.7	.....	2,278.2
Dec.	....	276.9	.....	2,332.8
Total	....	3,865.2		

American Institute of Steel Construction.

making, auto output, and freight carloadings during the week ended Sept. 23, pushing the final figure for STEEL's industrial production index down to 163 (1947-49 = 100).

A 5 point gain for the week ended Sept. 30 is based on rising trends in all sectors except electricity, which was expected to remain neutral. (See graph, Page 93.)

BAROMETERS OF BUSINESS

	LATEST PERIOD*	PRIOR WEEK	YEAR AGO
INDUSTRY			
Steel Ingot Production (1000 net tons)	2,131[1]	2,131	1,522
Electric Power Distributed (million kw-hr)	15,000[1]	15,025	14,161
Bituminous Coal Output (1000 tons)	8,670[1]	8,770	8,346
Crude Oil Production (daily avg—1000 bbl)	7,150[1]	7,145	6,849
Construction Volume (*ENR*—millions)	$465.4	$399.5	$409.5
Auto, Truck Output—U. S., Canada (*Ward's*)	135,358[1]	97,267	161,968
TRADE			
Freight Carloadings (1000 cars)	610[1]	606	632
Intercity Truck Tonnage (changes from year ago)	+2.7%	+0.3%	−2.1%
Business Failures (Dun & Bradstreet)	337	292	321
Currency in Circulation (millions)[2]	$32,612	$32,775	$32,004
Dept. Store Sales (changes from year ago)[2]	+4%	0%	+2%
FINANCE			
Bank Clearings (Dun & Bradstreet, millions)	$29,190	$30,992	$27,530
Federal Gross Debt (billions)	$291.8	$293.2	$288.9
Bond Volume, NYSE (millions)	$30.2	$26 4	$28.1
Stocks Sales, NYSE (thousands of shares)	16,556	15,915	16,853
Loans & Investments (billions, adjusted)[3]	$115.9	$115.1	$106.8
U. S. Govt. Obligations Held (billions)[3]	$33.2	$33.2	$28.0
PRICES			
STEEL's Finished Steel Price Index[4]	247.82	247.82	247.82
STEEL's Nonferrous Metal Price Index[5]	225.5	225.3	227.8
All Commodities[6]	118.7	118.6	119.5
Commodities Other than Farm & Foods[6]	127.1	127 2	128.2

*Dates on request. [1]Preliminary. [2]Federal Reserve Board. [3]Member Banks, Federal Reserve System. [4]1935-39=100. [5]1936-39=100. [6]Bureau of Labor Statistics Index, 1947-49=100.

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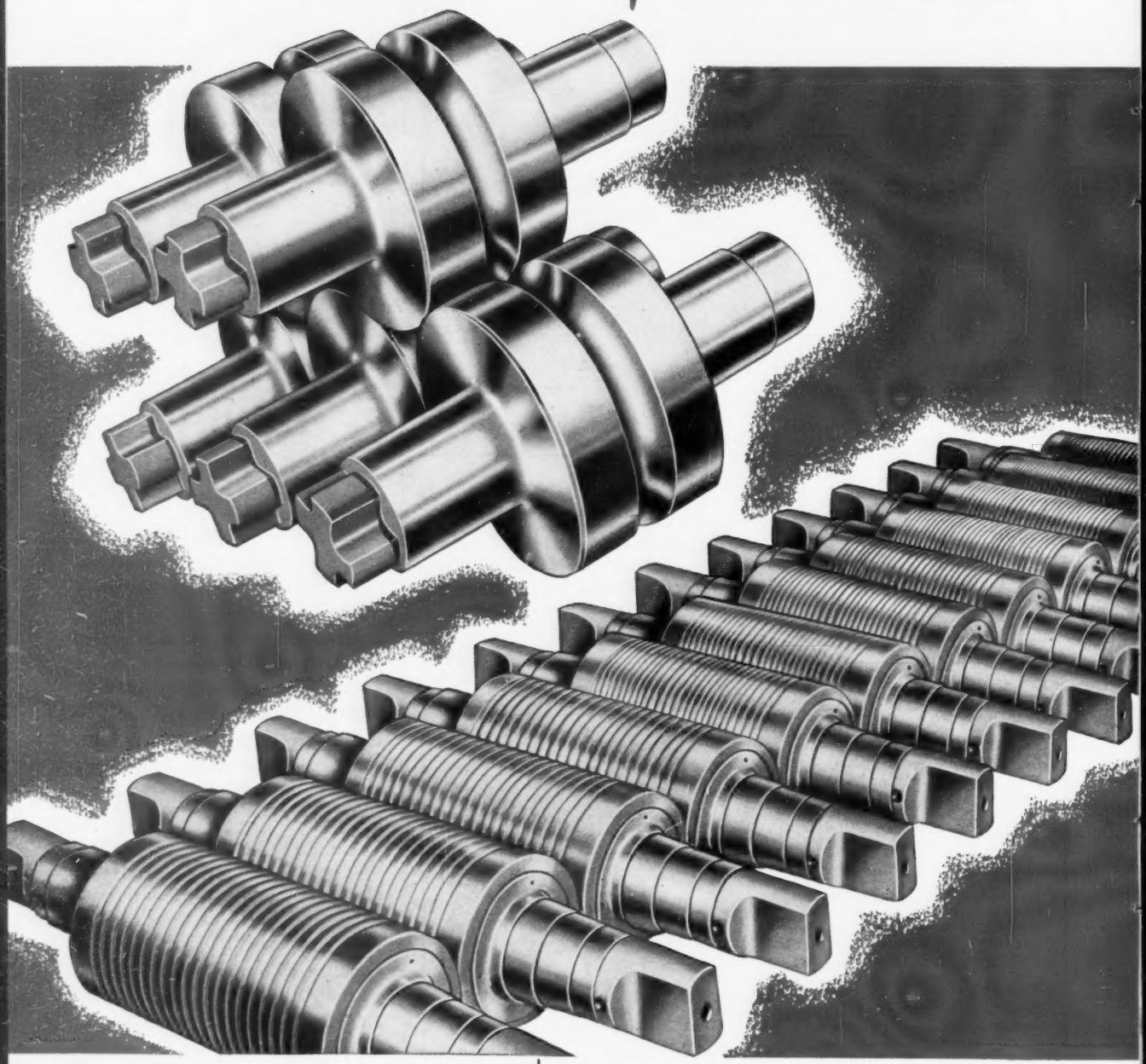

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OHIO IRON and STEEL ROLLS

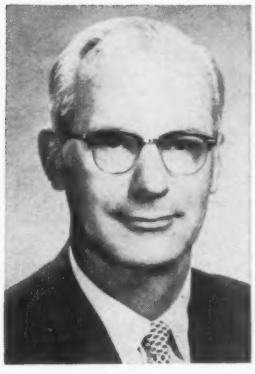
Carbon Steel Rolls	Flintuff Rolls	Denso Iron Rolls
Ohioloy Rolls	Double-Pour Rolls	Nickel Grain Rolls
Ohioloy "K" Rolls	Chilled Iron Rolls	Special Iron Rolls
Nioloy Rolls	Forged Steel Rolls	

PLANTS AT LIMA AND SPRINGFIELD, OHIO. *. Virtually at the center of the Steel Industry*

OR-50

I. NEVIN PALLEY
Curtiss-Wright exec. v. p.

E. W. CLAYTON
Cleco marketing dir.



HAROLD H. BREHOUSE
Stokes dept. manager

RUSSELL L. GILPIN
Dana div. sales mgr.

I. Nevin Palley was elected executive vice president, **Curtiss-Wright Corp.**, Wood-Ridge, N. J. He was president of I.T.T.-Federal Laboratories, Nutley, N. J.

E. W. Clayton, former sales manager, **Cleco Air Tools**, Houston, division of Reed Roller Bit Co., was named director of marketing and sales. **E. G. Clark** was made domestic sales manager; **J. G. Hudson** distribution manager.

Edward H. Wagner was made director-market planning, a new post at **SKF Industries Inc.**, Philadelphia.

Hugo Swan joined **Detroit Broach & Machine Co.**, Rochester, Mich., as superintendent, Machine Div. He was operations manager of Brooks Research Inc.

Haran W. Bullard was made general superintendent, Fairfield, Ala., Steel Works, Tennessee Coal & Iron Div., **U. S. Steel Corp.** Former general superintendent of the Fairfield Tin Mill, he succeeds **George D. Brengelman**, appointed chief engineer-maintenance for the division. **Russell W. Hutton** was made general superintendent, Sheet & Tin Mills.

Stephen Bukata was named director of research and development for **Tri Metal Works Inc.**, Riverton, N. J.

Charles B. Culbert Jr. was named Eastern district sales manager, Welding Products Div., **McKay Co.**, at New York.

Harold H. Brehouse was promoted to manager, Vacuum Pumps & Components Dept., Philadelphia, **F. J. Stokes Corp.**

W. C. Loeman and **S. A. Rogers Jr.** were elected vice presidents of **Parker-Hannifin Corp.**, Cleveland. Mr. Loeman is president, Parker Aircraft Co., Los Angeles, a division. Mr. Rogers is president, Parker Seal Co., Culver City, Calif., another division.

E. B. Hunter was made manager of production planning and material control, Harrison, N. J., Div., **Worthington Corp.**

Leslie J. Carson was made director of engineering, **Link-Belt Co.**, Chicago. He was general manager of the Colmar, Pa., plant. **John M. Shepard Jr.** was made general manager of the Atlanta plant and the Link-Belt Southeastern Div. to succeed **Roderick S. Galloway** who replaces Mr. Carson as general manager, Colmar plant.

Russell L. Gilpin was made sales manager, Universal Joint Div., **Dana Corp.**, Toledo, Ohio.

Richard W. Vollmer was made assistant to the president of **Strategic Materials Corp.**, New York. He was manager of the Direct Reduction Sales Dept. at Koppers Co. Inc.

H. Hayward Dinneen was named general manager of **Rust Furnace Co.**, Pittsburgh. He replaces **Frank A. Blaine**, resigned.

F. W. Monge was named manager, Virginia Div., **Electro-Tec Corp.** He was plant manager, I.T.T. Components Div. in Palo Alto, Calif.

Robert W. Mytton was named operations manager, **Kollstan Semiconductor Elements Div.**, Westbury, N. Y., of Kollsman Instrument Corp. **Charles G. Slemmons** was made sales manager.

Louis Schlossberg was made research manager, Chemical Process-

LESLIE J. CARSON

JOHN M. SHEPARD JR.

RODERICK S. GALLOWAY

Link-Belt executive appointments

DANTE C. FABIANI
Crane president

JOHN P. LYNN
American Welding & Mfg. post

WILLIAM C. FRENCH JR.
National Tube v. p.-sales

E. L. LaGRELIUS
Eastern Stainless plant mgr.

ing Div., **Detrex Chemical Industries Inc.**, Detroit.

Dante C. Fabiani was elected president of **Crane Co.**, Chicago. He was executive vice president.

John P. Lynn was made general manager, Industrial Products Div., **American Welding & Mfg. Co.**, Warren, Ohio. He was manufacturing manager.

Lee Ackerman was elected president, **Western Gold & Uranium Inc.**, New York.

Arthur S. Boehm fills the new post of sales manager, Industrial-Automotive Div., **Black & Decker Mfg. Co.**, Towson, Md. He was Eastern regional sales manager for the division. **Lester C. Kaefer**, former Pacific regional sales manager, becomes district manager of the newly formed Pacific Coast District. **Thomas H. Maddux**, former Central regional sales manager, was named sales manager of **Master Power Corp.**, Solon, Ohio, air tool manufacturing subsidiary.

William C. French Jr. was appointed vice president-sales, **National Tube Div.**, Pittsburgh, U. S. Steel Corp. He succeeds **Robert E. Williams**, resigned. **Arthur J. Elbert Jr.**, former sales manager-pipe lines, succeeds Mr. French as general manager-sales.

Motorola Inc., Communications Div., Chicago, elected corporation vice presidents: **Homer L. Marrs**, national sales director, Communications Div., was elected vice president-sales; and **William J. Weisz**, manager of mobile and portable communications products in the division, becomes vice president-communications products.

Edward L. Hradesky was named assistant to the president of **Amsler Morton Co.**, Pittsburgh, subsidiary of Textron Inc.

Robert E. Williams was elected vice president-sales, **Youngstown Sheet & Tube Co.**, Youngstown. He was vice president-sales at U. S. Steel Corp.'s National Tube Div.

E. L. LaGrelius fills the new post of plant manager, **Eastern Stainless Steel Corp.**, Baltimore. He was assistant to the vice president-general manager.

Ernest Davis was elected president, **Kickhaefer Mfg. Co.**, Milwaukee, to succeed **Edward A. Kickhaefer**, now chairman. Mr. Davis was executive vice president.

A. V. Lorch was made regional managing director of marketing for **Kaiser Aluminum International** in Europe and Africa. He has offices in London.

Clarence E. Larson was appointed a vice president of **Union Carbide Nuclear Co.**, New York, division of Union Carbide Corp., and general manager of **Oak Ridge** operations. He succeeds **Clark E. Center**, who continues as a vice president on special assignment.

John D. Winninghoff was made marketing manager, Research Precision Mechanisms Div., Danbury, Conn., **Barden Corp.** He was as-

ARTHUR S. BOEHM
Black & Decker sales post

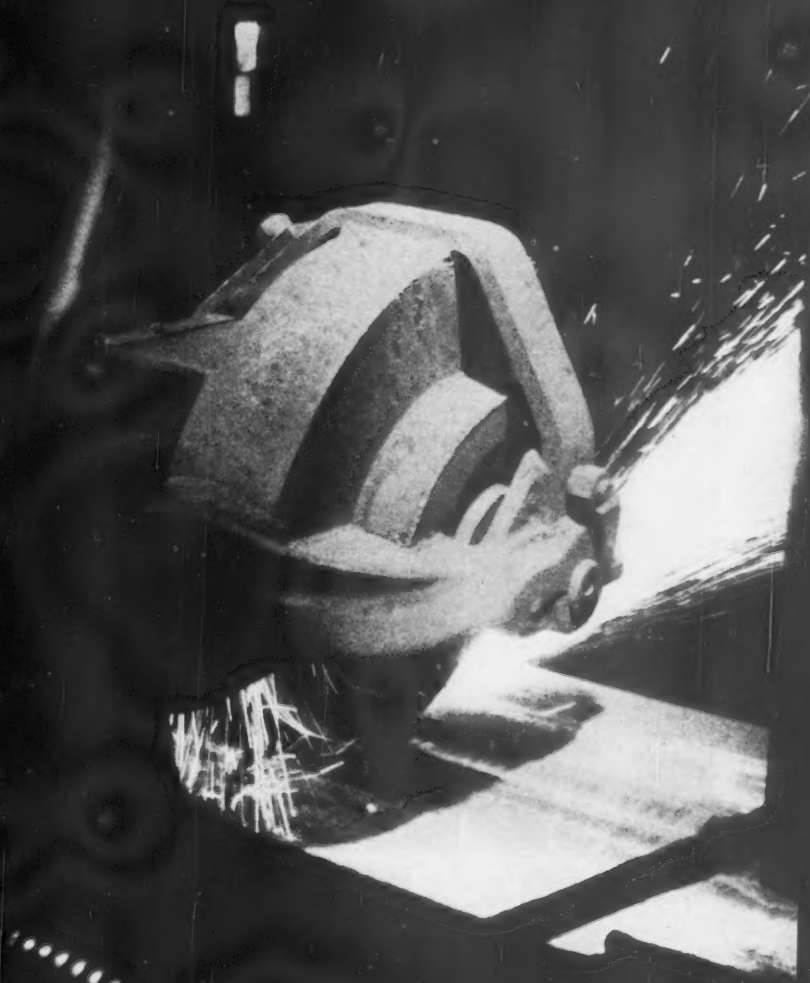
EDWARD L. HRADESKY
Amsler Morton executive

ROBERT E. WILLIAMS
Youngstown Sheet & Tube v. p.

JOHN D. WINNINGHOFF
Barden div. marketing

NEW DEVELOPMENT IN

RESINOID WHEELS for BILLET GRINDING



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- Especially developed for stainless and special alloy steels.
- Combine new high-strength grain with new bonding technique for dependable results.
- Operate at high head pressures on conventional mechanical grinders.
- Outperform and outlast wheels now in general use.
- Reduce overall grinding costs.
- Performance-proved in leading steel mills.

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I. W. THOMPSON
Thompson Industries pres.

DR. EDWARD E. ALTSHULER
Gabriel Electronics post

B. E. MEYER
Bliss div. sales mgr.

JOHN D. AMOROSO
Basco gen. plant mgr.

ANDREW W. PURCELL
Rosan div. sales mgr.

JOHN E. ELLIS
J&L warehouse v. p.

RONALD E. TOWNS Jr.
Youngstown Sheet mill supt.

ROBERT H. WASZ
Ryerson asst. v. p.

CHARLES E. SNEE
Timken mills supt.

sistant to vice president-marketing, Aeroflex Corp.

Ronald E. Towns Jr. was made superintendent of **Youngstown Sheet & Tube Co.**'s electric weld tube mill at the Brier Hill plant, Youngstown. He succeeds **Clifton R. Coburn**, retired.

Charles D. Michaelson was named vice president-mining, **Kennecott Copper Corp.**, New York.

Robert H. Wasz was made assistant vice president of **Joseph T. Ryerson & Son Inc.**, Chicago, responsible for administering fabricating and manufacturing. He is succeeded as general manager of the San Francisco plant by **Norman F. Rewoldt.**

Charles E. Snee was made superintendent, piercing mills at **Timken Roller Bearing Co.**'s Steel & Tube Div., Canton, Ohio.

I. W. Thompson, a corporate vice president of Space Equipment Corp., Torrance, Calif., was named president of its new division, **Thompson Industries.**

Dr. Edward E. Altshuler was named director of research and development for **Gabriel Electronics Div.,** Gabriel Co., Millis, Mass. He was with Electromagnetic Radiation Laboratory of the Air Force Cambridge Laboratories in Bedford, Mass.

B. E. Meyer was named sales manager, Hastings, Mich., Div., **E. W. Bliss Co.,** succeeding **Stanley E. Huffman,** now representative for Bliss in the Rochester, N. Y., area.

John D. Amoroso was made general plant manager of **Basco Inc.,** North Tonawanda, N. Y. He was plant manager and chief executive officer of Tube Manifold Corp. in North Tonawanda.

Andrew W. Purcell was made Western Div. sales manager, **Rosan Inc.,** Newport Beach, Calif.

John E. Ellis was named vice president-sales, Steel Warehouse Div., **Jones & Laughlin Steel Corp.,** Pittsburgh. He succeeds **Jennings R. Lambeth,** resigned. Mr. Ellis continues headquarters in Indianapolis, where he has been manager of that Steel Warehouse Div.

Malcolm Hunt, vice president and sales director of **Macklin Co.,** Jackson, Mich., was promoted to the new post of assistant to the president. **Jack Arnst,** sales manager, was promoted to director of sales.

A. W. Baker was made superintendent of the new Welded Tubing Dept., Shapeweld Div., **Solar Steel Corp.,** Union, N. J.

OBITUARIES...

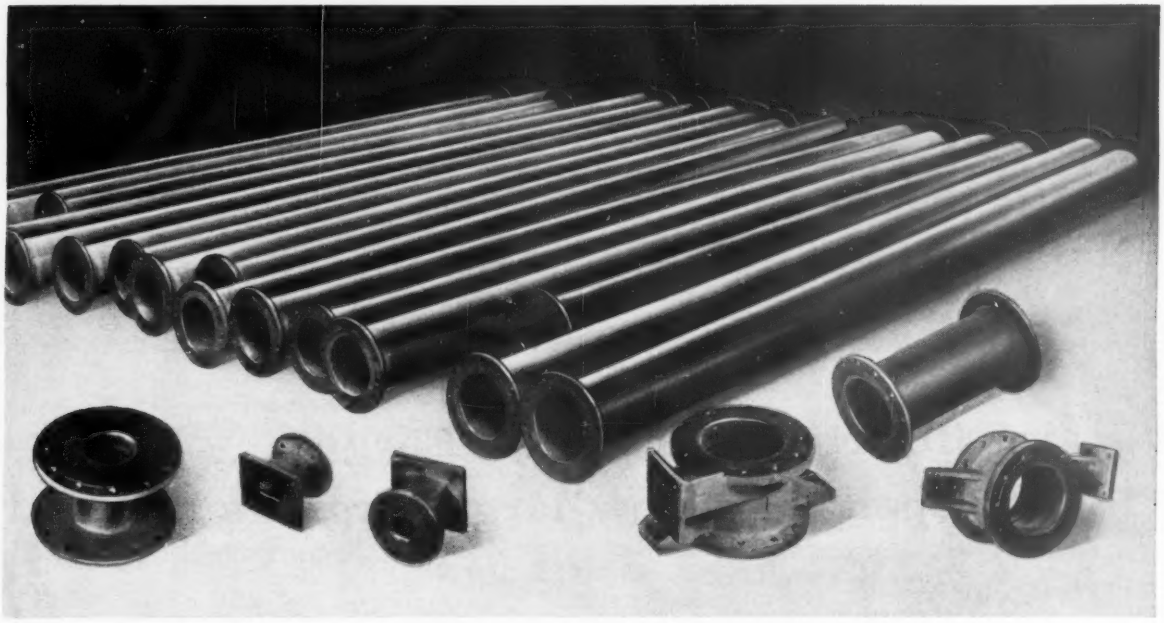
Harold R. Moorhouse, 58, executive vice president and treasurer, **Arthur G. McKee & Co.,** Cleveland, died Oct. 2.

George A. Milton, Sr., 72, founder and past president, **George A. Milton Can Co. Inc.,** Roslyn, N. Y., died Sept. 28.

HERESITE

REG. U. S. PAT. OFFICE

COATED IRON PIPES AND FITTINGS PROTECT YOUR PRODUCTS AND EQUIPMENT



Many industries rely on HERESITE PURE PHENOL-FORMALDEHYDE resin lining in steel pipes and steel pipe fittings to control corrosion and commodity contamination.

Since 1942 the oil industry has used millions of feet of pipe which were lined with HERESITE to reduce corrosion fatigue.

Catalog No. 60 will be mailed if requested on your letterhead.

HERESITE & CHEMICAL COMPANY — **MANITOWOC, WIS.**
——— MAIN PLANT AND OFFICE ———

GENERAL COATING, INC. — **WOODBRIDGE, N. J.**
——— EASTERN SUBSIDIARY ———

Canada: Dominion Rubber Co., Ltd. — ***Montreal, Quebec***

"Big Pearl" wanted her billets hot and fast!

THE ANSWER: A Plibrico Lined Car-Bottom Furnace

. . . and Plibrico helps Gulf Forge open up a new large forgings market!

Here's the story . . .

PROBLEM: "Big Pearl", an 804,000 pound Mesta forge, was losing production, standing idle and waiting because old, side door batch furnaces were too slow with billets. Gulf Forge's plans to enter the large forgings business were threatened.

SOLUTION: A completely new Plibrico designed, engineered and installed car-bottom furnace. Sides, roof, guillotine door lined with Plibrico Super "F" plastic refractory. Car top lined with Plicast "31" castable refractory. Completely monolithic.

RESULT: "Big Pearl" gets all the hot billets she can handle—"ala carte." Gulf Forge makes larger forgings at a nice profit and has broken into a big market closed to it before.

PLUS: In 2½ years of steady operation *no repairs at all* to the interior of the furnace. This because Plibrico Super "F" withstands both thermal and mechanical shock at operating temperatures from 2200 to 2800°F. Only minor repairs to the car-bottom lining. Furnace downtime cut to a minimum.

REFRACTORIES
INCINERATORS
ENGINEERING
CONSTRUCTION

Plibrico

PLIBRICO COMPANY

1806 North Kingsbury Street, Chicago 14, Illinois

Canadian Plant: New Toronto, Ontario

Sales and Service Throughout the World

Since 1914—Pioneers in Refractory Specialties

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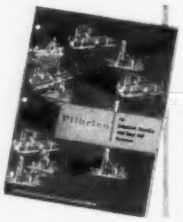

CATALOG 69 gives advantages, characteristics for foundry, steel mill, industrial applications.

Kaiser to Build $6 Million Plant

KAISER Aluminum & Chemical Corp., Oakland, Calif., will construct a $6 million plant for the production of hydrogen fluoride and fluorocarbons. The facility will be adjacent to the present alumina and caustic chlorine plants at the firm's Gramercy, La., Works.

"It will provide modern, efficient facilities from which we can supply our own requirements and at the same time will permit us to offer large tonnages to the industrial chemical market," says D. A. Rhoades, president.

The fluoride facilities at Gramercy will be integrated with an aluminum fluoride plant which has been announced (STEEL, Dec. 12, 1960, p. 74), and operations are scheduled for the latter part of 1962.

Hydrogen fluoride is being used increasingly in the production or processing of stainless steel, aluminum fluoride, uranium, cryolite, fluorocarbons, petroleum, glass, certain inorganic salts, and special metals. The aluminum and fluorocarbon industries account for about 70 per cent of hydrogen fluoride usage.

Foreign Subsidiary Formed

Howe Sound Co., New York, has organized Howe Sound International Inc. in Liberia to handle expanding activities in foreign markets being conducted by many divisions of the parent firm. Theodore Operhall, president of Misco Precision Casting Co., a Howe Sound division, is also president of the overseas division. His offices are at 500 Fifth Ave., New York, N. Y.

P&W Seeks New Materials

Pratt & Whitney Aircraft Div., East Hartford, Conn., United Aircraft Corp., has established a special facility to develop new materials for aircraft, space and industrial powerplants. The new Advanced Materials Research & Development Laboratory at North Haven, Conn., will be directed by Dr. M. E. Shank. Principal goals of the laboratory will be development of high strength materials, alloys for service at extreme temperatures, and materials for energy conversion devices.

National Acme Licenses Mitsubishi Shipbuilding

National Acme Co., Cleveland, has licensed Mitsubishi Shipbuilding & Engineering Co. Ltd., Tokyo, Japan, to manufacture machine tools in that country. The licensing agreement is subject to approval by the Japanese government and covers models of Acme-Gridley multiplespindle automatic machines. Mitsubishi Zosen produces ships and is expanding its machine tool manufacture at Hiroshima to supply the increasing Japanese demand for machine tools.

New Plant Will Produce Stainless Clad Aluminum

Composite Metal Products Inc., Washington, Pa., will erect a facility at Eightyfour, Pa., for the production of stainless clad aluminum. The facility will have rolling mills and finishing equipment. The plant will be in operation during the second quarter of 1962.

Fabricator Expanding

Pittsburgh-Des Moines Steel Co., Neville Island, Pa., has completed expansion of its Birmingham plant, virtually doubling its capacity. The project included construction of an assembly bay and an area for housing the accessory department and machine shop. Additional fabricating equipment was installed.

3M to Sell Division

Minnesota Mining & Mfg. Co., St. Paul, is negotiating for the sale of its Zenith Plastics Div., Gardena, Calif., to H. I. Thompson Fiber Glass Co., Los Angeles.

Bassick Co. Expands

About 140,000 sq ft of manufacturing space has been added to the main plant of Bassick Co. at Bridgeport, Conn., by purchase of land

(*Please turn to Page* 106)

Capacability means

Imagination

When it comes to oxygen furnace refractories, *imagination* is Basic. And, Basic can be your "fountainhead" of new refractory ideas. Take TARBLOK and TARMIX for example.

Six years ago the first U. S. oxygen steel producer looked to Basic for tar-bonded furnace lining refractories. With four years of intensive research behind us, we were ready. Today, Basic is a fully integrated supplier of these materials — shipping to virtually every oxygen steelmaker in the Western hemisphere.

If you use basic refractories, you can depend on Basic's *capacity* and *ability*. Write for 24-page booklet outlining application of Basic's more than thirty dead-burned dolomites, ramming and gunning refractories, patching materials and tar-bonded linings for basic oxygen furnaces.

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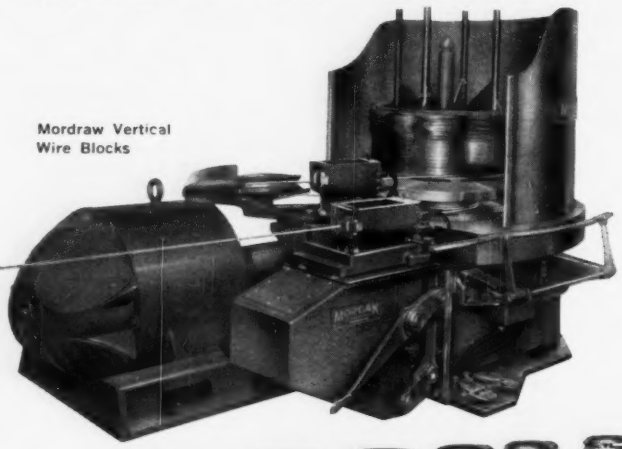
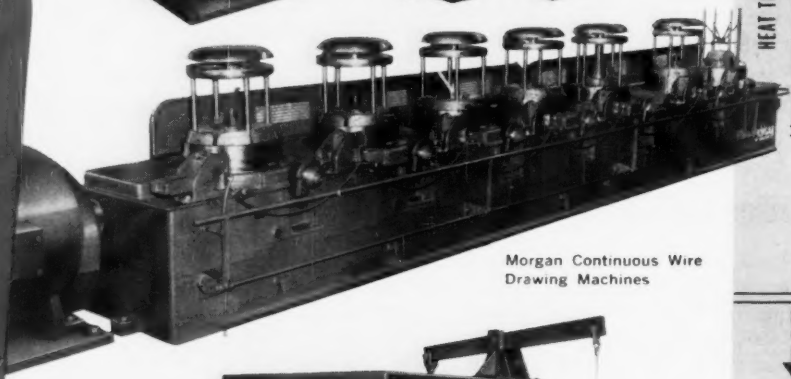
Only at Morgan can you obtain the dual advantage of wire mill design services backed by the complete line of wire drawing equipment . . . two vital factors which will make quality and profitability the end result of your wire drawing operations.

FIRST — Morgan offers you total-concept engineering counsel backed by the industry's broadest wire mill design and operating erection experience. Morgan engineers will study every phase of your individual production

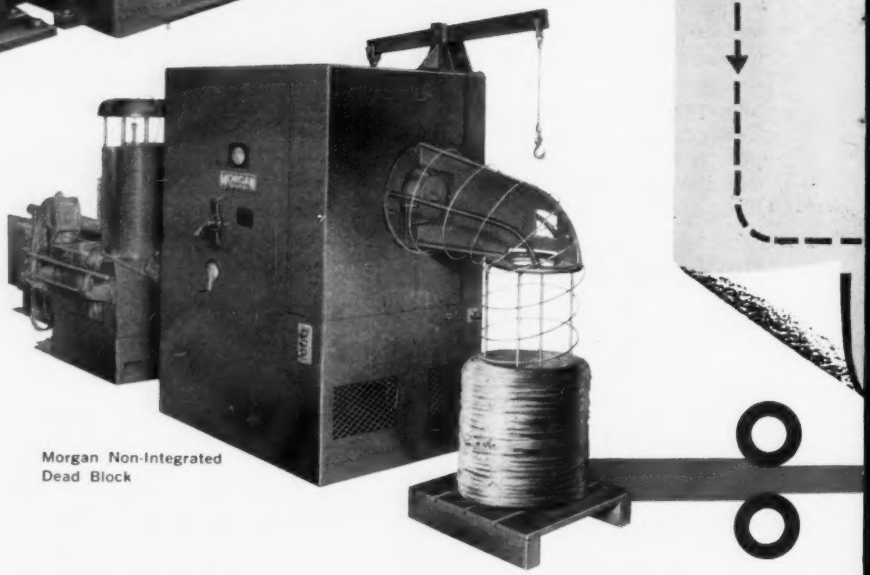
with the only LINE OF WIRE DRAWING MACHINERY complete for any production need



Mordraw Vertical Wire Blocks



Morgan Continuous Wire Drawing Machines



Morgan Non-Integrated Dead Block

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ROLLING MILLS

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PUTS PROFITS

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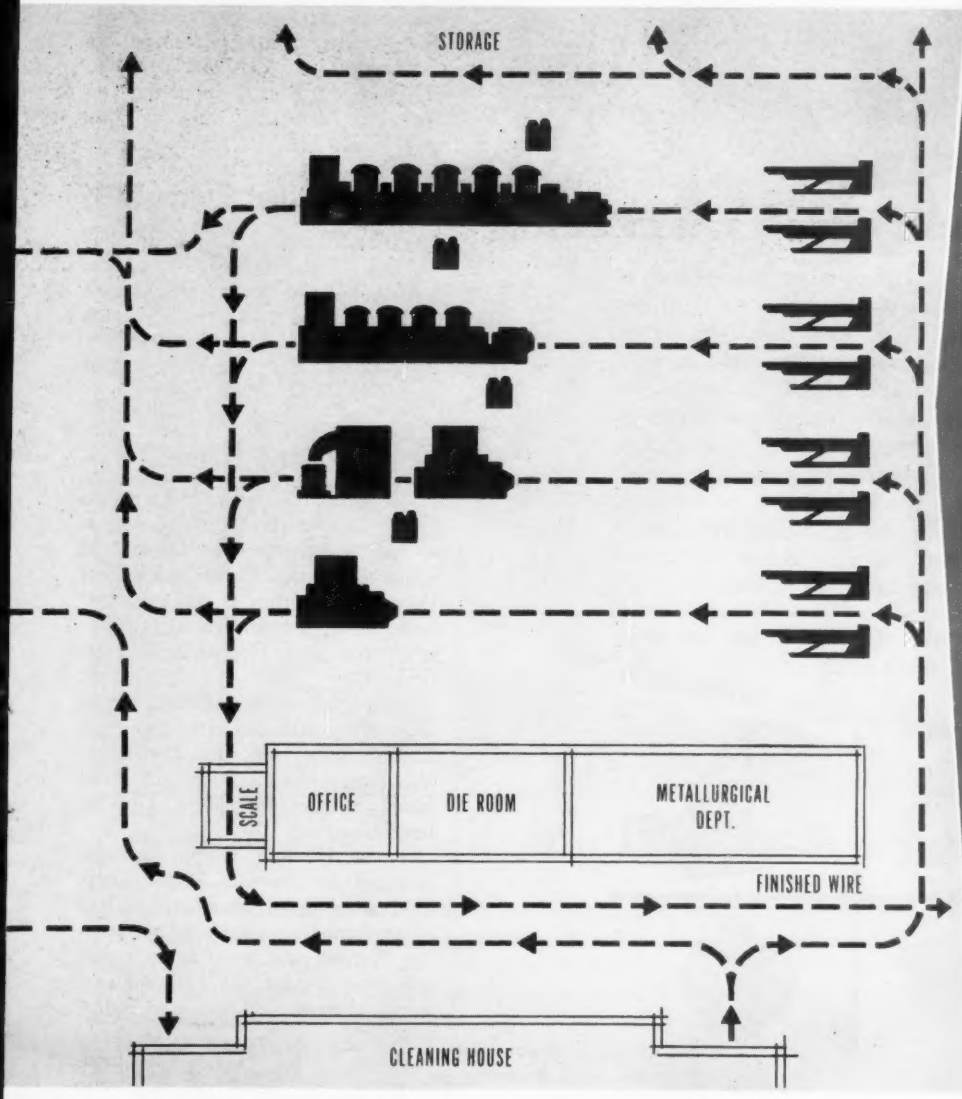
problem from economic feasibility to long-range potential and will supply basic data for sound decisions.

SECOND — You have available the complete line of Morgan Wire-Drawing machines and accessories . . . proven wire drawing equipment with an outstanding record for reliable, cost-cutting operation. Morgan equipment is engineered from the ground up to provide flexibility and economy through the broadest range of operating conditions.



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MORGAN CONSTRUCTION CO.

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WIRE DRAWING MACHINES

COMBUSTION CONTROLS

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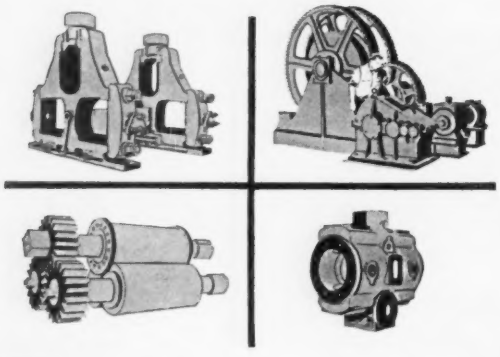
Chances are that you have us in mind as specialists in marine components and sugar machinery. It's a fact that our reputation was built on serving these fields, and we continue to do a large volume in them. What we would like to tell you is that we've expanded our facilities over the years to the point of extreme capability in electric furnace steel castings of medium and high carbon content, semi-steels in our iron foundry, and aluminum, monel and the various alloys of brass and bronze in our non-ferrous foundry. Our machine shop is equipped with some of the largest and most diversified tools in the South—rounding out our complete foundry facilities.

Service Foundry would like to work for you. Your inquiry will bring a prompt, definite reply.



SERVICE FOUNDRY
416 ERATO ST. · JAckson 2-3836 · NEW ORLEANS 13, U.S.A.
a division of AVONDALE SHIPYARDS, INC.

(*Concluded from Page* 103)

and buildings formerly occupied by Aluminum Co. of America. Bassick is a subsidiary of Stewart-Warner Corp. The new space will be utilized in the manufacture of casters, office chair controls, floor protection equipment, and other Bassick products, says W. K. Meyers, president.

Sprague Buys Equipment

Sprague Electric Co., North Adams, Mass., purchased all the equipment previously used by CBS Electronics Div. for the manufacture of electrochemical precision-etch transistors. Columbia Broadcasting System Inc. dissolved its Electronics Div. at Lowell, Mass., and sold the plant to Raytheon Co. Sprague's Transistor Div. is at Concord, N. H.

Graphite Plant Enlarged

National Carbon Co., a division of Union Carbide Corp., New York, is installing additional facilities at its Lawrenceburg, Tenn., plant for the production of high density graphite for the nation's space program. Cost: $500,000.

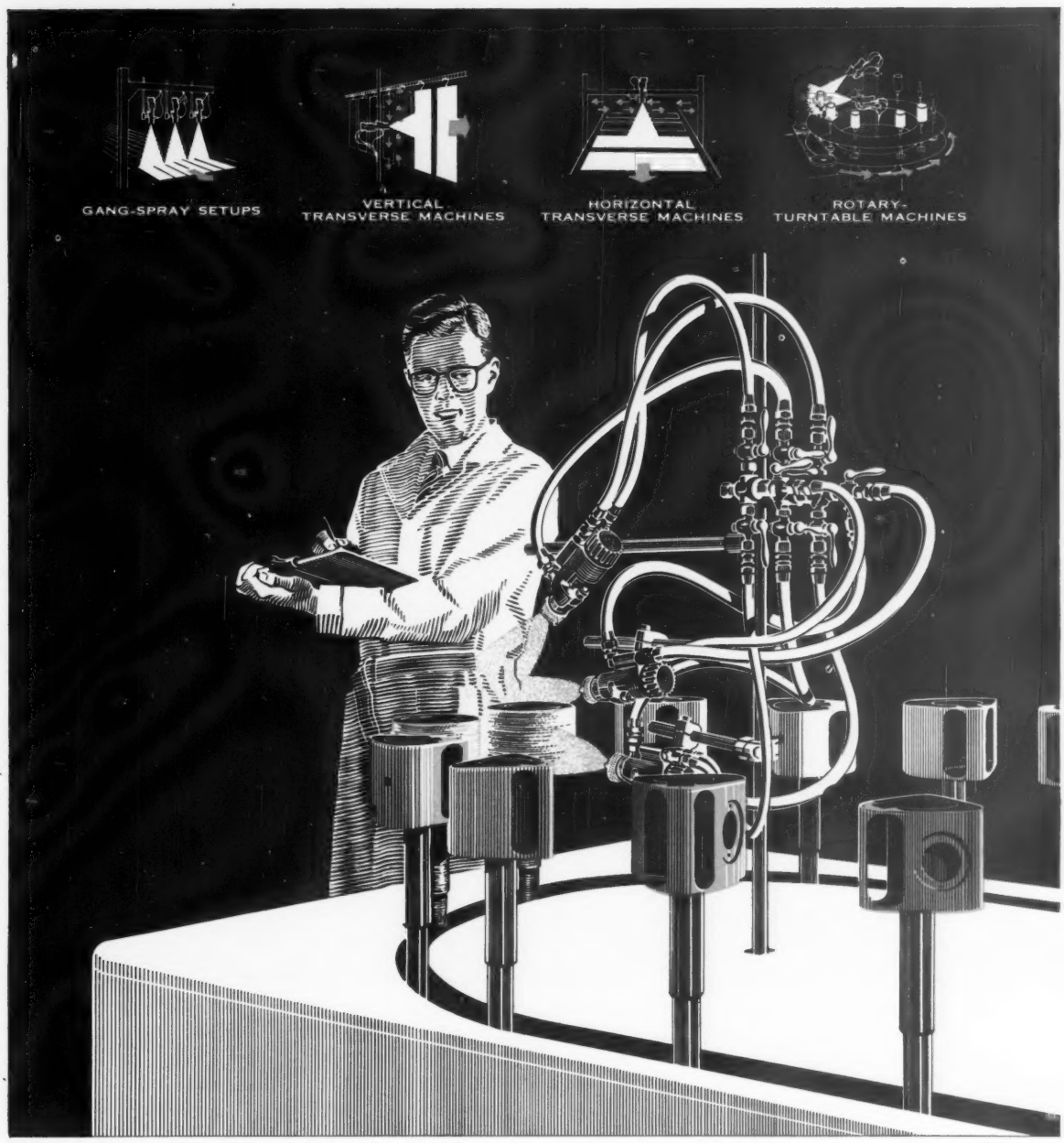
Firms Change Names

Western Automatic Machine Screw Co., Elyria, Ohio, a division of Standard Screw Co., changed its name to Western Cold Drawn Steel Div. J. A. Gorney is general manager; A. E. Schowalter, sales manager; and F. J. Greenich, superintendent.

Caloric Appliance Corp., Wyncote, Pa., changed its name to Caloric Corp. The firm makes gas kitchen appliances, curtain wall panel, corrugating siding, and related items.

Vapor Heating Corp., Chicago, changed its name to Vapor Corp. The company has broadened its line of products from passenger car heating systems and controls to essential products for the bus, subway, missile, aircraft, oil, gas, and industrial fields.

Eaton Mfg. Co., Cleveland, changed the name of its Pump Div. to the Marshall Div., Marshall, Mich. The division produces automotive components, including hydraulic pumps, fan drives, a limited-slip differential, and units for power



Know in advance if automatic spray will work for you!

Many manufacturers have benefited from the uniform and precisely controlled application of automatic spray. DeVilbiss makes it easy to find out whether automatic spray is practical and economical for you, *before you buy*. Here's how:

Utilizing your own coating formulation, we'll give samples of your products trial production runs on standard automatic machines, duplicating your in-plant conditions as closely as possible. The results will let you know whether or not automatic spray will pay off for you. Our report tells you the most economical production rates and recommends which type of automatic machine will give you the best job at lowest possible cost. No charge for this service.

More likely than not, automatic spray *can* boost your finishing rates and cut your material consumption. If you're interested, let us know. We'll take it from there. The DeVilbiss Company, Toledo 1, Ohio. Also Barrie, Ontario; London, England; São Paulo, Brazil. Branch offices in principal cities.

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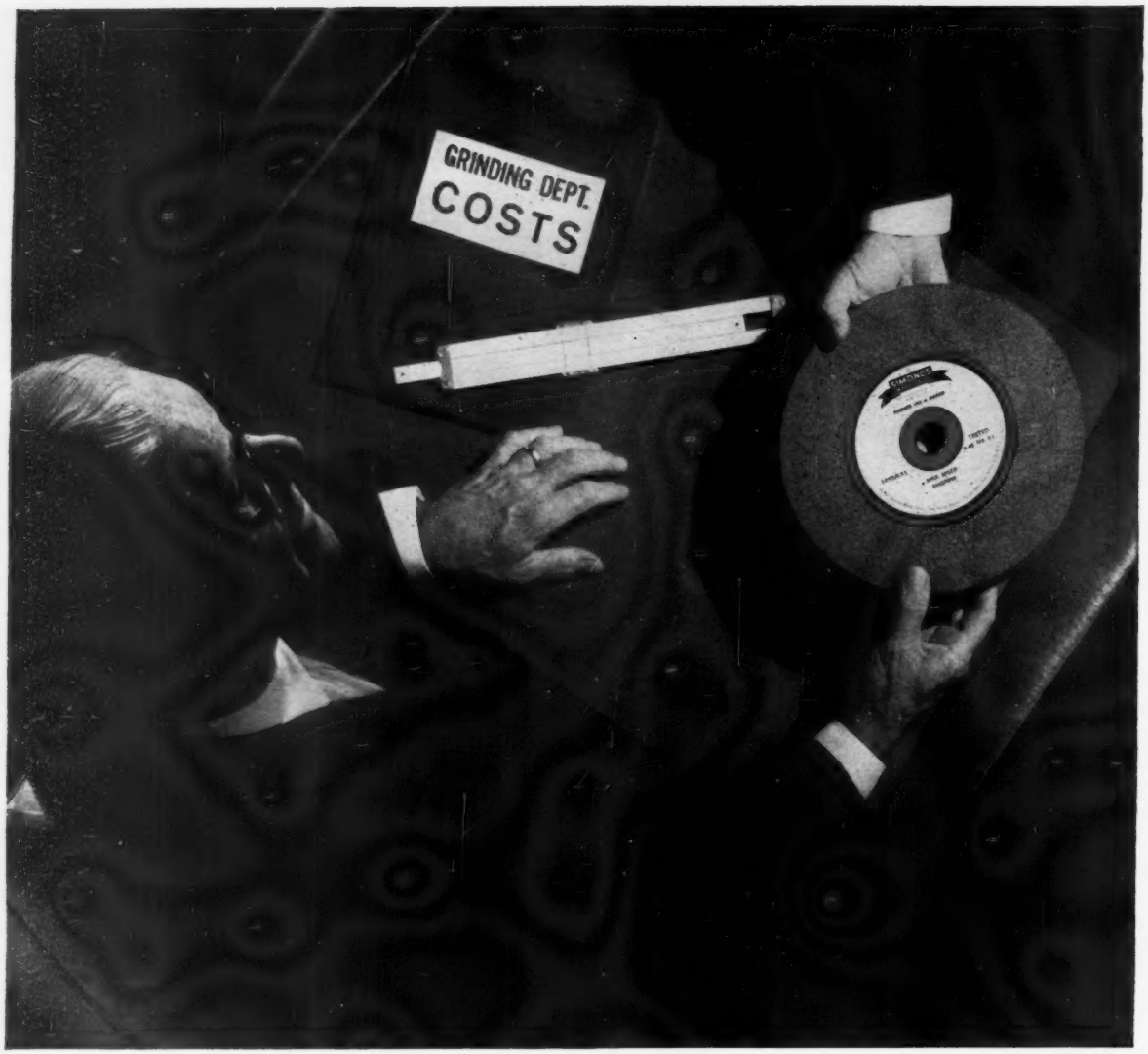

An important cost ratio . . .
and how to improve it

Wheel life to wheel output! With that ratio right, you save machine and operator time . . . cut rejects. And that's where Simonds can help you. How? With grinding wheels that head into the work with a bite that keeps biting . . . wheels with speed and stamina to make fast, efficient work of the toughest, hardest metals . . . wheels that save set-up time by often eliminating the need for wheel change when switching operations . . . wheels your Simonds distributor can supply in specifications that give you that essential, cost-cutting ratio between performance and production. Send for illustrated catalog now.

SIMONDS ABRASIVE CO.
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DIVISION OF SIMONDS SAW AND STEEL CO.

your "buy-pass" for better grinding
CALL YOUR SIMONDS DISTRIBUTOR
helping YOUR business is HIS business

WEST COAST PLANT: EL MONTE, CALIF. — BRANCHES: CHICAGO • DETROIT • LOS ANGELES • PHILADELPHIA • PORTLAND, ORE. • SAN FRANCISCO SHREVEPORT — IN CANADA: GRINDING WHEELS DIVISION, SIMONDS CANADA SAW CO., LTD., BROCKVILLE, ONTARIO • ABRASIVE PLANT, ARVIDA, QUEBEC

steering. The division maintains a research and development laboratory in Detroit.

Heco-Pacific Mfg. Formed

Hamerslag Equipment Co., South San Francisco, Calif., organized a subsidiary, Heco-Pacific Mfg. Inc., to manufacture material handling equipment. Officers include: J. P. Hamerslag Jr., chief executive officer; E. J. Block, vice president and chief engineer; and H. L. Hamerslough, secretary-treasurer. The new firm's address is 110 Freeway Blvd., South San Francisco, Calif.

Natco Enlarges Facilities

National Automatic Tool Co. Inc. has officially opened its 365,000 sq ft plant at Richmond, Ind. The company is offering a variety of new products.

Airtrol Div. Established

Robbins & Myers Inc., Springfield, Ohio, formed an Airtrol Div. to specialize in the production of unit type collectors for the control of dusts and mists encountered in commercial operations. New machinery and production facilities for the division are being readied in Springfield for early fall production schedules. E. J. Stone is manager.

NEW ADDRESSES

Chemplate Inc., specialist in electroless nickel plating, moved into its $350,000 plant at 4355 Sheila St., City of Commerce, Los Angeles, Calif. Operations that had been in Los Angeles and Compton, Calif., have been consolidated in the new 25,000 sq ft facility.

Lintern Corp., manufacturer of replacement crane cabs and air conditioners for crane cabs and pulpits, moved into a 40,000 sq ft plant on Station Street, Mentor, Ohio.

Radio Corp. of America, New York, moved the Seattle branch office of its **Electronic Data Processing Div.** to the Washington Building, that city. W. S. McCalmont is branch manager.

(*Please turn to Page* 112)

Another case history on TORIT Dust Collectors

"What have you done about this DUST?"

In our plant trouble is spelled D-U-S-T. And our plastics production V.P. wanted to know what I had done to get rid of it. He was mad, and frankly, I didn't blame him. Dust was costing us a lot of money each year—in machine wear, misalignment and down time—to say nothing about absenteeism and poor morale among the workers. How could the plant help but be dusty—with grinders, lathes, milling and molding machines running 16 hours a day.

But I explained that I had checked on several dust control systems. The problem was that in 6 months we planned to expand and re-model the shop. It seemed like throwing good money after bad to invest in a control system now. But the V.P. wanted action. He told me about a Torit engineer who had called on him claiming he had a dust control system that offered complete *flexibility.* Then he gave me his card and suggested I call him immediately.

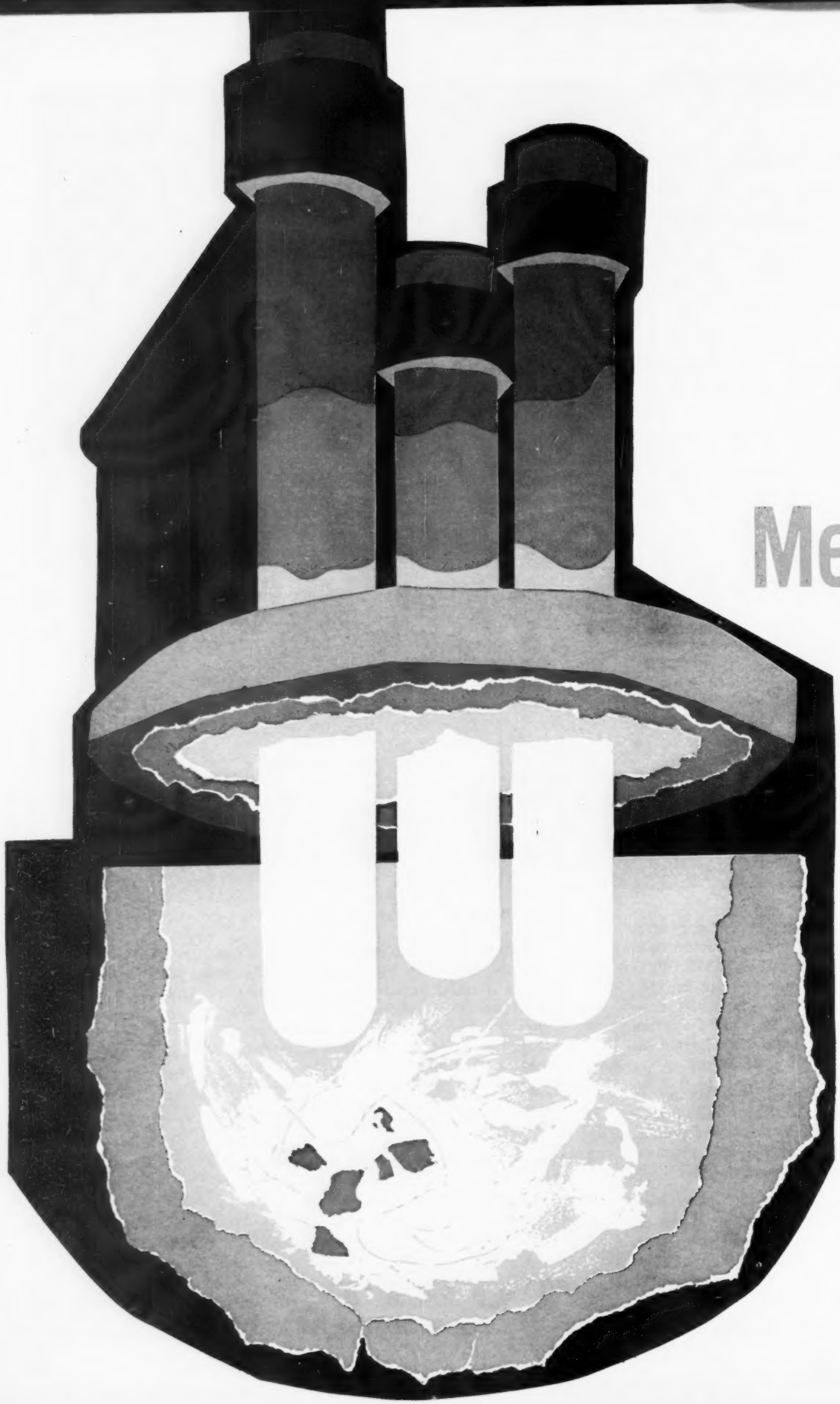
Believe me, I called that Torit man, but fast. He explained to me the flexibility his system offered—how with just minor changes it could be adapted to the new plant layout. I bought one of his Torit Model 24 Cyclone machines for less than $1,000. It services 2 molding machines, a double-end grinder, 2 lathes and a milling machine. And it really performs—has practically eliminated the dust in our shop. We're finishing our expansion and I have ordered another Torit Dust Collector to service our additional machines. You'd hardly recognize our shop now. It's clean. Production is up—morale is up—absenteeism is lower than ever.

Cyclone Model 24

Torit can solve your dust problems. For complete facts on dust . . . and how to control it . . . write

TORIT manufacturing company

1133 Rankin St., St. Paul 16, Minn., Dept. 1232


Melt

the Cost of Making Steel

with NATIONAL CARBON'S "Four-Point Program"

Steel men know: The heart of the electric furnace is the electrode. Upon it depends so much of the success of furnace operations. But an electrode's performance is based on more than its component materials alone. Electrodes must be *engineered* to meet particular and demanding production conditions . . . and backed up by the supplier's reputation, service and facilities. Let NATIONAL CARBON help you reduce production costs through its "Four-Point Program."

Point 1

75 years of research and production experience in carbon products have built maximum life into "National" electrodes . . . providing more tons of steel per pound of electrode . . . saving the industry millions of dollars in materials and down-time.

Point 2

An industry-wide training program covering electrodes and electric furnace practices . . . designed to provide highest product performance through better utilization of power . . . to reduce refractory maintenance.

Point 3

Advanced electrode packaging and special-device gondolas speed shipments when and where needed . . . to save inventory and storage space . . . to keep investment at the most economical level. National Carbon's pool-car program provides these advantages for customers remote from its plants.

Point 4

Unsurpassed raw material supplies and technical skills at strategically located plants minimize electrode costs.

"National" and "Union Carbide" are registered trade-marks for products of

NATIONAL CARBON COMPANY

Division of Union Carbide Corporation, 270 Park Ave., New York 17, N.Y.

UNION CARBIDE

666. Jomac work glove. Reversible—any two make a pair. Men's knitwrist.

It's GLOVEMANSHIP that makes JOMACS

your best buy in industrial work gloves

GLOVEMANSHIP is an art. It involves combining the ideal yarns, processing the cloth by techniques which will impart the wearing and protective qualities desired, creating patterns, styling cuffs and, finally, producing the finished gloves with real craftsmanship. Jomac practices GLOVEMANSHIP.

What does GLOVEMANSHIP mean to you? It means lower glove costs with quality gloves that afford maximum dexterity, more comfort; that resists oils, greases and stains; that protect hands and forearms against such hazards as cuts, burns, bruises and abrasions; that can be washed time after time.

For better fit, greater dexterity, more comfort, longer wear, and maximum safety in handling most chemicals, oils, greases, etc. — specify North PVC Coated Gloves.

To keep workers dry and comfortable in foul weather and to give them superior protection against chemicals, oils and greases—specify North PVC Protective Clothing.

Write for more information about Jomac industrial work gloves today.

JOMAC **Jomac Inc., Dept. E Phila. 38, Pa.**

In Canada: James North Canada Company, Ltd., Simcoe, Ont.

"Jomac Sells Quality . . . and Quality Sells Jomac!"

(*Concluded from Page* 109)

Allied Chemical Corp., New York, moved the technical service laboratory of the General Chemical Div. to the company's Morris Township, N. J., research center. Previous site was in Edgewater, N. J.

NEW OFFICES

Republic Steel Corp., Cleveland, opened sales offices for its **Steel & Tubes Div.** in Tulsa, Okla., and Houston. District sales managers are W. L. Garay at Houston and R. E. Hornak at Tulsa. J. J. I. Jamieson is the division's general manager of sales.

Kaiser Steel Sales Corp., a newly formed subsidiary of Kaiser Steel Corp., Oakland, Calif., opened an office in Honolulu, Hawaii. G. C. McClintock is in charge.

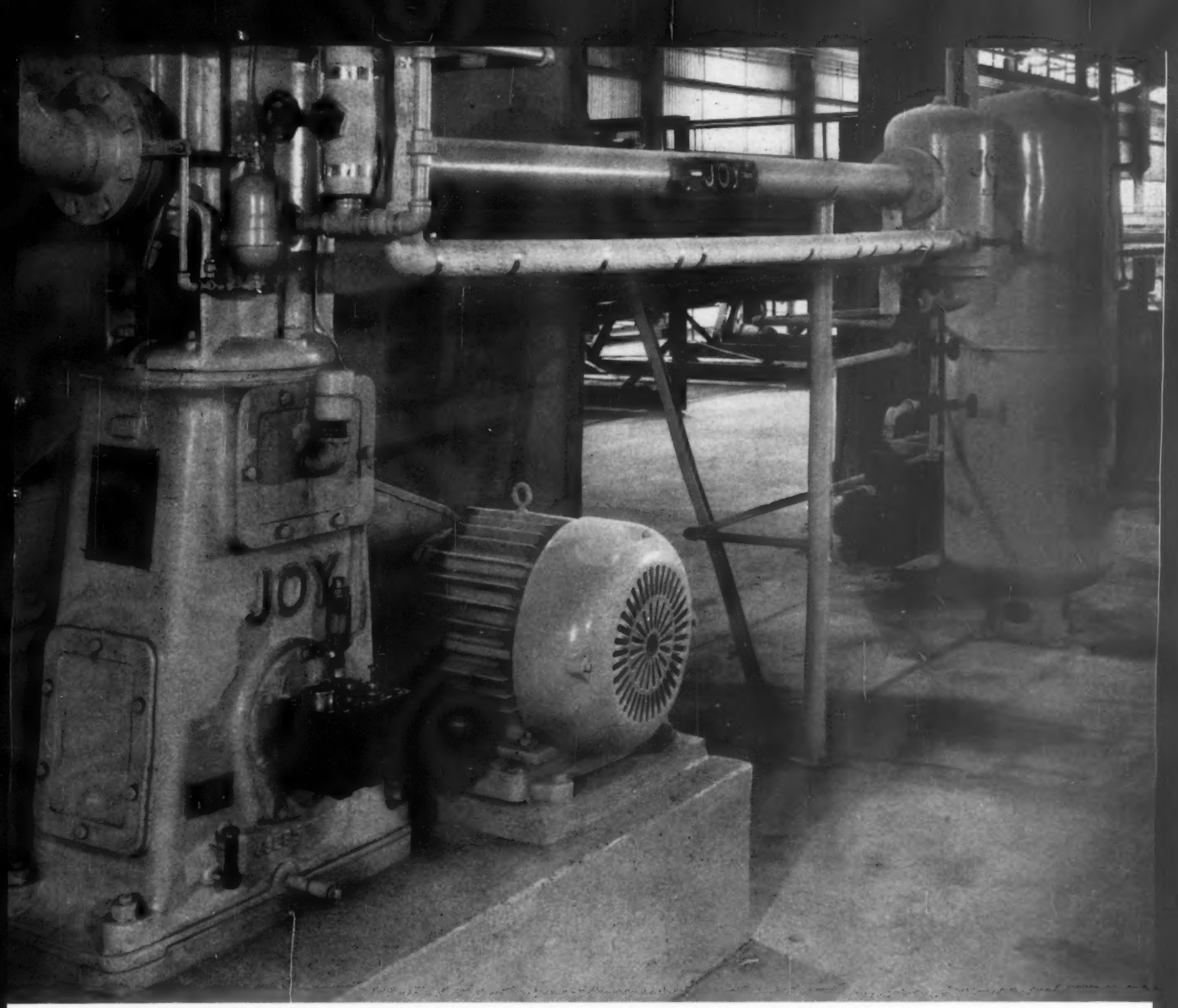
CONSOLIDATIONS

Subject to approval of stockholders **Ceco Steel Products Corp.**, Chicago, will merge with **Mitchell Engineering Co.**, Columbus, Miss., manufacturer of metal buildings. The Southern company will be operated as a division of Ceco, producer of construction components.

Vulcan Materials Co., Birmingham, purchased **National Safety Engineers Inc.**, that city, manufacturer of highway traffic signs and metal stampings. Vulcan will operate the property as part of its Birmingham Slag Div. under the name of Vulcan Signs & Stampings Div. J. E. Montgomery is vice president and general manager of the new division.

Taco Heaters Inc., Cranston, R. I., acquired **DuCas Corp.**, Providence, R. I., and will operate it as a subsidiary.

Subject to approval of stockholders, **Metal & Thermit Corp.**, New York, and **Udylite Corp.**, Detroit, will merge. Udylite will continue under its present management as a division of Metal & Thermit. Udylite is a supplier of metal finishing



Century motor powers air compressor around the clock . . . .

This 25-horsepower Century motor helps furnish compressed air vital to the manufacture of gypsum-derivative products. With the plant operating three shifts daily, a constant supply of compressed air is needed to sustain the manufacturing process.

Century motors are especially suited for compressor applications because of their capacity to take frequent on-off cycling. Their high starting torque activates the tightly enclosed compressor pistons almost instantaneously. The Century totally-enclosed-fan-cooled enclosure offsets the presence of abrasive dust in the plant.

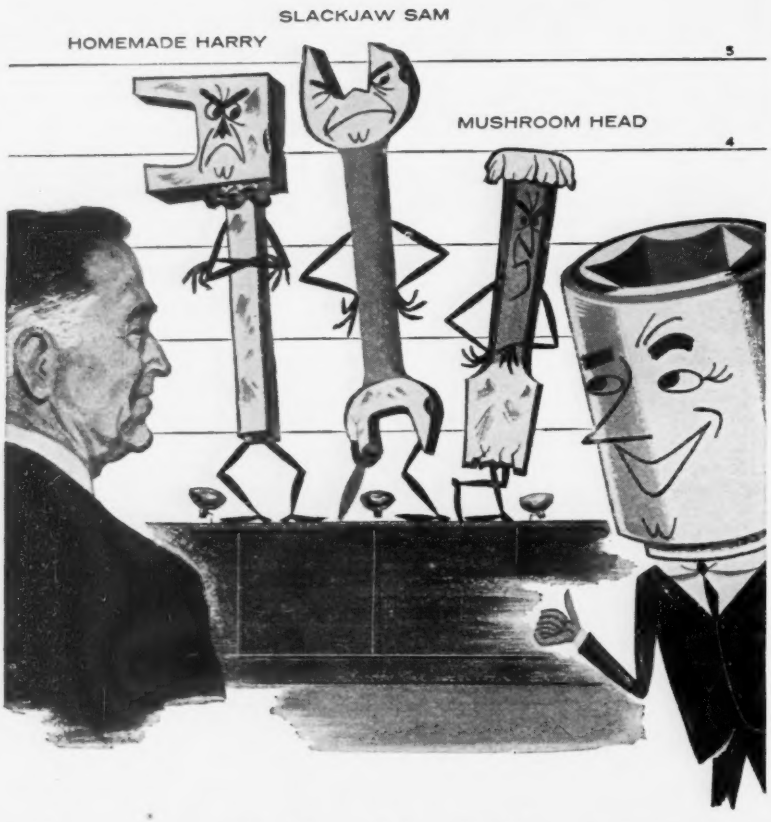
The Century Electric combination of a complete motor line (over 10,000 types, from one-twentieth to 400 horsepower) and a national sales organization whose exclusive interest is in motors, assures you of getting the right motors for your needs. If you have a motor question, contact your nearby Century sales engineer or your authorized Century motor distributor.

CENTURY ELECTRIC COMPANY

St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-13



Sneaky Culprits Like These Stole $60 Million Last Year

Hand tool accidents last year cost industry 60 million dollars in compensation costs alone — not counting millions more in related costs.

Big offenders are the faulty and makeshift tools that lurk in pockets, tool chests and other unsuspected spots. Hidden away, these culprits are easy to overlook in a safety program.

Two positive steps to accident prevention (and low-cost efficiency) are good hand tools and tool-use education. Both can be furnished by your *Snap-on*® Tools representative. This qualified specialist can analyze your hand tool program . . . recommend the correct standard or special tools . . . demonstrate their proper use.

New Tool Safety Film Available

A new *Snap-on* film, "Tool Safety," is now ready for showing to your safety committee or any other plant personnel. Just write us and we will have the nearest *Snap-on* branch arrange to show the film and supply copies of an accompanying booklet on tool safety.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8121-J 28th AVENUE • KENOSHA, WISCONSIN

equipment and materials; Metal & Thermit, chemicals, coatings, minerals, chromium plating processes and materials, welding equipment, and detinning.

Electro Consolidated Corp. acquired through a subsidiary, **Electro Luminaire Corp.**, Chicago, the business of **Curtis-Allbright Lighting Inc.**, Chicago. Both companies manufacture lighting equipment.

NEW PLANTS

Congdon & Carpenter Co., Providence, R. I., opened a metal service center at 6 Congdon Rd., Natick Industrial Park, Natick, Mass. Steel, including stainless, and aluminum will be stocked in the 24,000 sq ft facility.

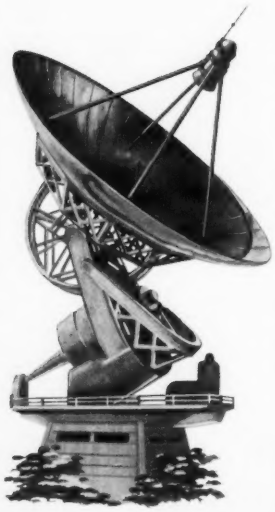
N. E. Slavin Co. has moved into its new offices and plant at 297 Third St., Cambridge, Mass. The firm is tripling its capacity and warehouse facilities. Operations being expanded include slitting and shearing.

Air Reduction Sales Co., a division of Air Reduction Co. Inc., New York, will build a $3 million oxygen plant near Huron, Ohio. The facility will be erected on a site adjacent to a methanol facility being built by E. I. du Pont de Nemours & Co. The oxygen plant will have a daily capacity of more than 250 tons and will be operated by Airco. A pipeline will carry oxygen and some nitrogen to Du Pont's plant site.

Air Reduction Pacific Co., a division of Air Reduction Co. Inc., has completed construction of a helium compressing plant at 4959 N. W. Forest St., Portland, Oreg. The plant with supporting transportation and distribution equipment represents an investment of about $250,000. Helium for the plant is obtained from government wells in Texas and Oklahoma. Special railroad cars transport the gas to Portland. Helium is used widely in the welding of aluminum, stainless steel, copper, and special alloys and in the refining of rare metals such as titanium, zirconium, hafnium, and beryllium.

STEELMAKING AT JESSOP

Survival? It could depend on a 3,000-mile picket fence



Ever-vigilant sentinels against surprise attack are the radar installations along the DEW Line. Stretching 3,000 miles across Canada and Alaska, this electronic fence is our first line of defense.

At bleak, lonely outposts Air Force and civilian technicians watch for tell-tale blips on radarscopes—Distant Early Warning of the possible approach of enemy aircraft or missiles.

This all-weather system must withstand the worst of the elements—sub-zero temperatures, high velocity winds, rain, snow and ice storms common to the Far North. And dependability of the equipment could determine whether or not we survive an attack.

There are numerous applications for specialty steels made by Jessop Steel Company in DEW Line installations. For example, forging quality alloys and wear-resistant tool steels for the gear mechanism of a rotating surveillance radar; cast-to-shape steel for certain other component parts and precision ground steels for delicate instrumentation.

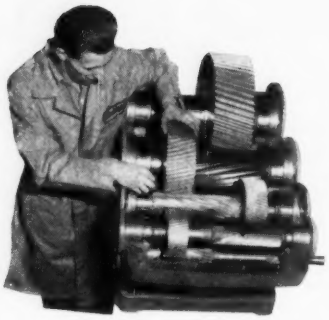
Jessop is keenly aware of the importance of built-in dependability in the steelmaking process—whether meeting specifications for steel to be used in the nuclear reactor of a Polaris-firing submarine; a Redstone missile to launch an astronaut; an earth-girdling satellite; or a DEW Line radar installation.

Yes, for dependability, you can rely on Jessop . . . the *big* name in specialty steel.

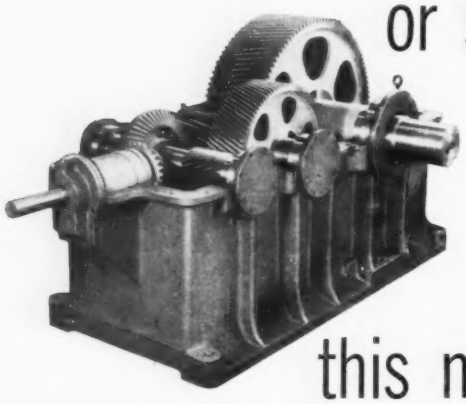
Plants and Service Centers:
Washington, Pa. • Los Angeles • Chicago • Detroit • Owensboro, Ky. • Wallaceburg, Ont.

JESSOP

If you need gear drives that can deliver more power in less space... reduce vibration



or sound levels... or operate at higher speeds yet last longer... look for this nameplate.



It means that drive gearing has been hardened and precision ground to give radically improved gear accuracies. Yet they cost no more. For full details...

write on your company letterhead for "An Advanced Concept in Modern Gearing"

AGMA
MEMBER

PHILADELPHIA GEAR DRIVES

PHILADELPHIA GEAR CORPORATION
King of Prussia (Suburban Philadelphia), Pa.

Technical Outlook

TITANIUM SUBS—A welding process developed by Battelle Memorial Institute, Columbus, Ohio, for a Navy program permits joining 2 in. titanium plates (5/8 in. have been the thickest joined to date). Members attending the fall meeting of the American Welding Society at Dallas learned the details last week. It is expected to bring significant improvements in Naval vessel performance.

IMPROVED MICROWAVE MATERIAL—Yttrium iron garnet (YIG) makes an excellent, one way, line transmission device for microwaves, says Bell Telephone Laboratories, Murray Hill, N. J. Company scientists reported to the International Conference on Magnetism and Crystallography at Kyoto, Japan, that its properties in some respects exceeded those of ferrites.

EXPLOSIVE FUTURE—Hardening of stainless steel castings is the next probable step for explosive techniques, believe experts of E. I. du Pont de Nemours & Co. Inc., Wilmington, Del. Hardening of railroad parts made of Hadfield steel is being done on a production basis.

PRECISELY CAST—Late examples of precision casting: A crankshaft made for Continental Motors Co., Muskegon, Mich., weighed 151 lb as cast, 147 lb when finish machined; cast dies for cutting leather blanks are sharp enough as cast—no machining is needed, says Precision Castings Corp., Detroit.

LIGHTWEIGHT CAPS—Aluminum caps at a rate of 24,000 an hour are made by new equipment constructed by Girdler Process Equipment Div., Chemetron Corp., Chicago. It will be employed by bottlers, manufacturers, and custom cap makers.

ALLOY CLOSES GAP—A new steel alloy, called "SR" closes the performance gap between stainless and many of the superalloys, states Kolcast Div., Minerva, Ohio, Thompson Ramo Wooldridge Inc. It is austenitic, nonmagnetic, and age hardenable, has higher yield and tensile strength at room and elevated temperatures than stainless steels, the firm claims. The alloy does not rely on critical or expensive alloying components like cobalt, columbium, titanium, or zirconium.

GOAL: EQUAL DEBURRING—Ford Motor Co., Detroit, is interested in ultrasonic deburring of small parts. Main hurdle to success: Wave patterns often cancel each other in some areas, not in others, creating unequaled deburring. Ford wants to do both inside and outside diameters at the same time.

NONEXPLOSIVE ROCK BLASTER—A system called electrothermal forcing employs radio frequency electricity to break up rocks—what formerly took hours or days, can now be done in seconds, claims General Electric Co., Schenectady, N. Y., which supplies the systems. Costs are from 5 to 25 times cheaper than current methods for secondary blasting.

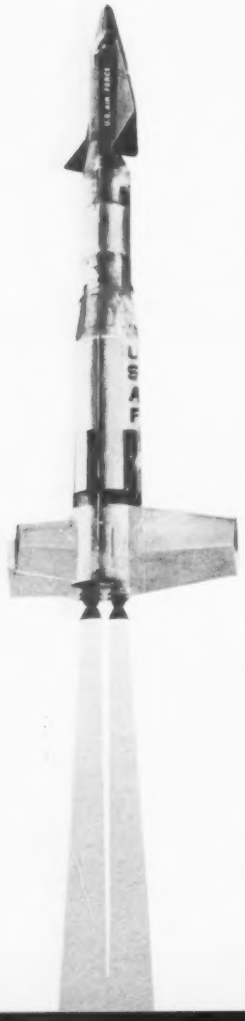
MOON PROBE—Seven "surveyor" space vehicles will land on the moon during 1963-65, states Datex Corp., Monrovia, Calif., a subsidiary of Giannini Controls Corp. Flights will take 66 hours. Retro rockets will insure a 6 mph landing. The firm will supply antenna positioning systems for the "explorers."

STUDY SURFACE REACTIONS—By studying what happens to a single-molecule layer of gases on metal surfaces, scientists at Bell Telephone Laboratories, Murry Hill, N. J., hope to unlock the secrets of corrosion and catalytic reactions. It could lead to marked advances in catalytic chemistry, states Dr. L. H. Germer.

'PERMANENT' GREASE JOBS—Chassis lubrication for 1962 cars is guaranteed for 30,000 or 32,000 miles. Next step: Seven years or 100,000 miles. It's expected several carmakers will announce such benefits for owners by 1963, certainly by 1964.

To meet advanced airframe needs for 18,000 mph, rocket-boosted spaceplane . . .

Boeing Reduces Superthin, Superalloy Tubes



• ULTRATHIN tubes of superalloys are solving the structural problems of boost-glide space vehicles like the Dyna-Soar, say Richard Sipe and Benjamin Wilkins, research engineers, Manufacturing Development Section, Boeing Co., Seattle.

Test mockups have already proved that "squeeze" reduced tubes of Rene 41 with walls only 0.010 in. thick are strong enough to withstand heat and stresses that will be encountered in space flight.

No circumferential welds are permitted, so Boeing engineers came up with a novel way to reduce tube ends so that a large number could be welded to gusset plates at structural joints.

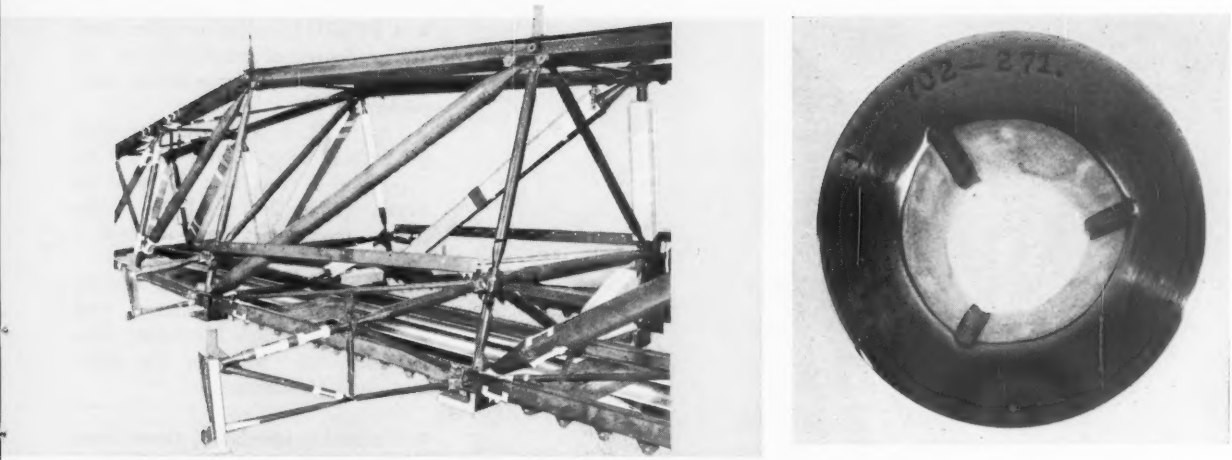
Here's how the complex job was solved.

• Tubes are forced through a die (not hammered), reducing them gradually. Thirty-five stages with three intermediate annealings are needed to reduce a typical tube.

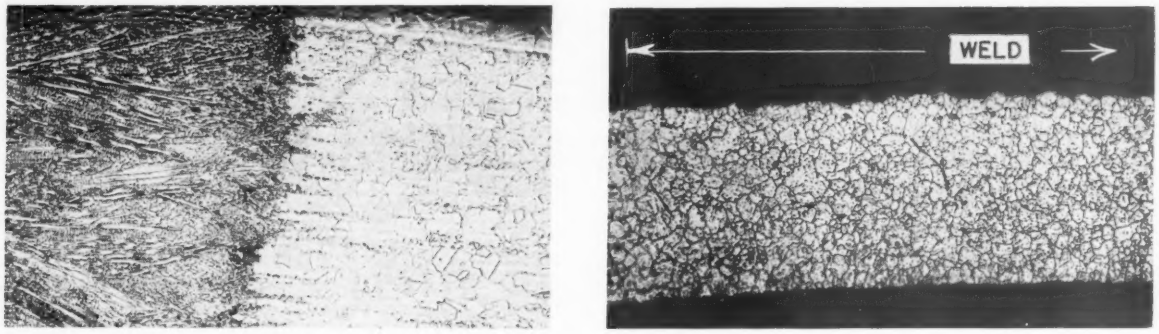
Conventional swaging isn't successful, say Boeing engineers, because the weld zone of the tubing is rather brittle (Rene 41 tubes are made by welding a formed sheet). Severe bumping of cam actuated rollers fractures the tube wall.

Difficulties encountered during early forming tests revealed the need of preparing the tubing to improve formability. Tubes are cold drawn to reduce diameter and wall thickness. A minimum of 43 per cent reduction completely recrystallizes the cast structure of the weld bead.

The reducing process forces a tube supported with backup metal (Cerrobend) through a tapered die similar to the one illustrated (it doesn't contain the grooves). The process is successful with any equipment that will retain the tube and force the die over the end. The tube is



Prototype of the Dyna-Soar (left) is made mostly of Rene' 41 tubes with 0.010 in. walls. Thirty-five taper dies (like the one at right except for grooves) reduce the ends



As-welded tubes are reduced 43 per cent by cold drawing to recrystallize welds and improve formability. Left is as-welded structure; right, after drawing

reduced from 1.5 to 1.0 in. (ten steps), to 0.75 in. (ten steps), to 0.625 in. (five steps), then to 0.5 in. (ten steps). Total: 35 steps.

Boeing employs a modified Valli #7 tube end forming machine for many reduction stages. Tubes are clamped in the crosshead which contains dies to match the outside diameter of the tube for each reduction step. A backup tail stock prevents slipping (stops are located with a master).

The reducing die is mounted on the driving ram of the machine. As the tube takes shape, the die travels over the end of the tube. A microswitch set with a master controls forward motion to insure that the transition area is held to a smooth 10 degrees. The taper must be flat within plus or minus 0.003 in.

• During the development of forming, low column strength of the thin walls restricted the amount of end force which could be applied. A supporting liner of a fusible alloy prevents collapse and gives a smooth transition surface.

At first, engineers tried a heavy aluminum backup tube inside the Rene 41. It was successful for forming one end. Low melting alloys like Cerrobend are more successful (they allow forming of both ends and fast removal for annealing).

A high temperature oil protects the tube interior from the fusible alloy. Here are the steps employed: Vapor degrease and dip in alkaline bath; fill tube with oil and drain (leave a film inside); fill tube with Cerrobend; core tube ends by drilling to facilitate reductions; reduce; melt out the fusible alloy; vapor degrease and dip in alkaline bath; pickle in nitric acid-hydrogen peroxide-acetic acid mix; rinse and dry.

Of course, that is repeated after each annealing (three times).

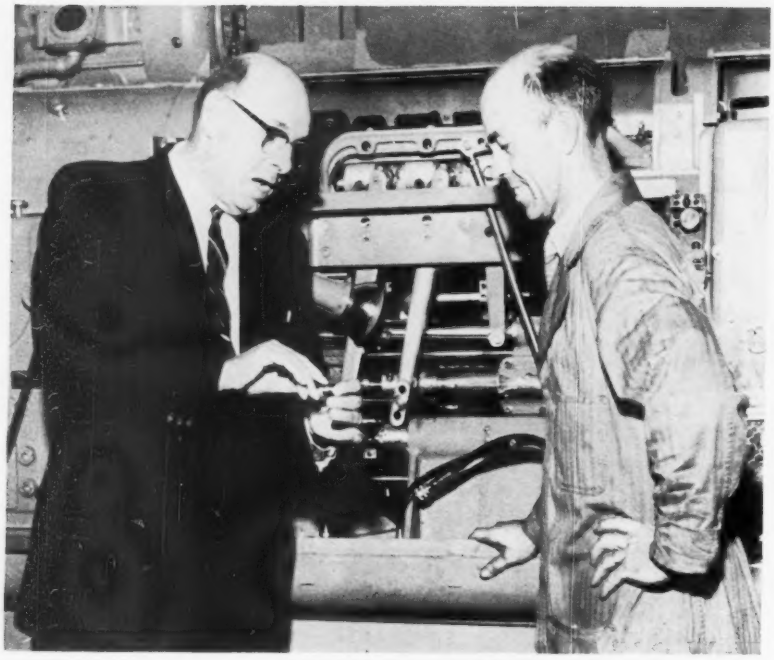
• Interstage annealing is needed because the weld is brittle and 0.010 in. tube walls have too little resistance to crippling.

For maximum ductility, the Rene 41 is heated to 2100° F for 3 minutes in an inert atmosphere and quenched in water. A maximum 5 second quench delay minimizes scale formation and promotes better ductility.

Subsequent welding of tubes to gussets in the Dyna-Soar structure calls for a solution heat treatment at 1975° F for 10 minutes and a water quench. Final aging at 1400° F for 16 hours completes the treatment.

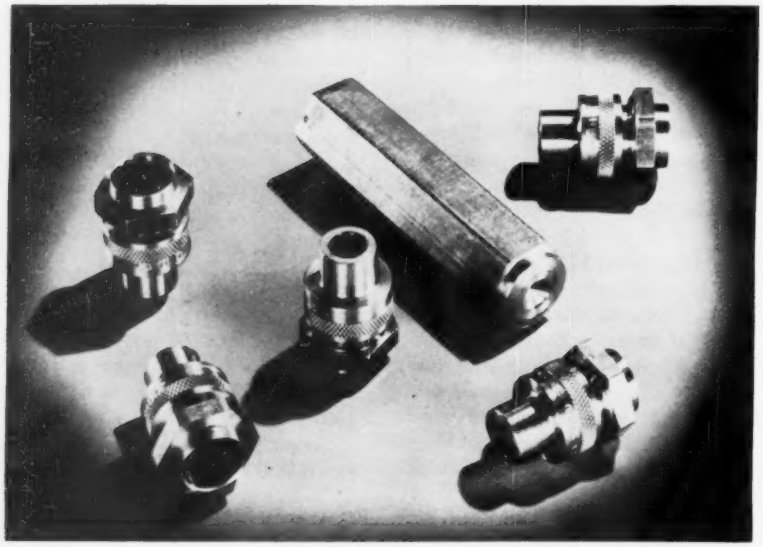
(Boeing has built complete processing data into chart form.)

• An extra copy of this article is available until supply is exhausted. Write Editorial Service, STEEL, Penton Bldg., Cleveland 13, Ohio.



Cone's R. R. Rhodehamel (left) says the new tellurium grade of steel is so machinable that it could lead to requirements for higher speeds in machine tools used to cut the metal. Cone tests documented the benefits of tellurium

'Buttercut' Tag Tied on Tellurium Grade Steel



Sparkplug shells were cut from tellurium steel at 3½ times the normal rate

• A PINCH of tellurium gives steel a new degree of machinability. A series of cutting tests provides such evidence.

The steel is a modified leaded grade made by Inland Steel Co., Chicago. It was first revealed in STEEL (Apr. 24, p. 173). Some Inland researchers have dubbed it "buttercut."

The machining tests were run by La Salle Steel Co., Chicago, and Cone Automatic Machine Co., Windsor, Vt. Most of the work was done at Windsor.

• Machining speeds 3½ times those used on conventional steel worked well on the tellurium grade.

One set of tests was on sparkplug shells made from 13/16 in., hexagon bar stock, run on Cone's latest, six spindle, automatic screw machines. After two weeks of preliminary sampling runs, adjustments of the machine and tooling were made, and the basic tests were begun at 528 sfpm (twice the normal speed for the job).

At the same time, the feeds were also increased a third over normal to 0.0035 in. per revolution.

At those speeds and feeds, the shells had the proper quality, so the speed of the automatics was increased step by step to 618 sfpm. Tool wear at that speed was normal. The drills showed no appreciable wear. Engineers feel that even the 618 sfpm is not the maximum for the job.

R. R. Rhodehamel, Cone's vice president of manufacturing, concludes: "This steel offers a new concept in machinability, and it will bring about the development of new, automatic screw machines to run at higher speeds. In fact, the product development group at Cone is working on a series of heavy duty, high speed, fast index machines to be in position to accept the challenge of the new steels."

Thomas A. Kelly, president of La Salle, says: "We believe this tellurium steel holds great promise for high speed machining of parts. This means more production and lower unit costs."

La Salle is marketing the new steel in a wide variety of sizes. (Additional sizes will be made available soon.) Cost: About $15 a ton above the conventional grade, says the company.

Do It Better, Cheaper With Standards

This centrifugally cast mandrel, 50 ft long, is made in sections

• WATCH OUT for those special analyses when specifying or buying parts! They can add to costs, lengthen delivery times, limit sources of supply. Producers of materials and components, associations, and the government are helping to further standardization.

Use of standard specifications can save a lot of negotiation. Most producers accept standard "specs," don't argue about their ability to meet or beat the minimums.

• Material choice may be determined in the initial design; once it's done, change to a standard is nearly impossible and always time consuming.

The American Society for Testing & Materials, organizations like the Steel Founders' Society, or the American Iron and Steel Institute, publish standard analyses or physical property charts. Used by the designer, they help in keeping the specifications in the standard range.

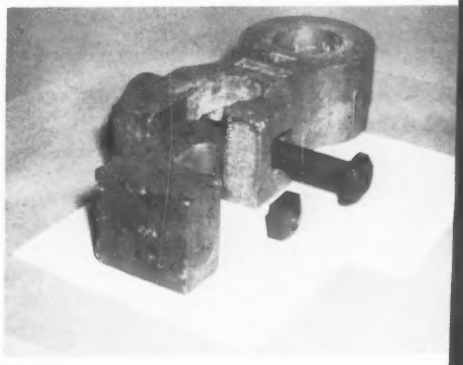
The designer needs to think of what the part is to do, where it will be used, the load it must withstand, and the way it will be treated. And, right on the drawing board, the profit of the part may be determined (see Design for Profit Growth, STEEL, July 31, p. 35).

Material choice and part shape are interrelated. For most efficient use of material and part, the design and material should be considered together. Material choice may even determine whether the part can be made at all, in the desired shape.

• Tabular data on materials should be near at hand for design or redesign of parts.

STEEL's Metal Selector provides information on many ferrous and nonferrous metals; the Selector will appear in the Oct. 16 issue this year. More detailed information on individual alloys comes from the producers and the associations. Proper use of the data can be a make or break decision, say designers and production men.

As an example of the use of this



Two alloys are used in this hammer; the wearing face is easily replaced

General Engineering Types of Steel Castings

STRUCTURAL GRADES—CARBON STEELS

Tensile Strength, psi	60,000	65,000	70,000	80,000	85,000	100,000
Indicated Application	Low electric resistivity; desirable magnetic properties; carburizing and case hardening grades; weldable	Excellent weldability; medium strength, with good machinability and high ductility		High strength carbon steels with good machinability, toughness, and fatigue resistance		Wear resistance, hardness
Current Specifications*	ASTM: A27-60 U60 — 30 60 — 30 ASTM: A216-60T WCA AAR: M201-53 Grade AU Grade AA Military: MIL-S-15083B Class B A.B.S.: Class 1, Hull	ASTM: A27-60 65 — 35 SAE: Auto. 0030 Federal: QQ-S-681d Class 65-35 Lloyds Class A ASTM: A352-60 L C B MIL-S-15083B Class 65-35	ASTM: A27-60 70-36 ASTM: A216-60T WCB AAR: M201-53 Class B Military: MIL-S-15083B Class 70-36 A.B.S.: Class 2	SAE: Automotive 080 Federal: QQ-S-681d Class 80-40 Military: MIL-S-15083B Class 80-40 Class 80-50	SAE: Automotive 0050	SAE: Automotive 0050 Federal: QQ-S-681d Class 00508

Values listed directly below are those normally expected in the production of steel castings for the tensile strength values given in the upper portion of the chart.[3] The values listed below are only for general information and are not to be used as design or specification limit values.

Tensile Strength, psi	60,000	65,000	70,000	80,000	85,000	100,000
Yield Point, psi	30,000	35,000	38,000	45,000	50,000	70,000
Elongation in 2 in., %	32	30	28	26	24	20
Reduction of Area, %	55	53	50	43	40	46
Brinell Hardness No.	120	131	140	163	175	207
Charpy Impact Keyhole	30	30	30	25	20	30
70° F V-Notch	35	50	40	36	25	45
Charpy Keyhole — 50° F	8	12[5]	10	12	10	15
Impact V-Notch — 40° F	8	18	20	14	12	12
Endurance Unnotched	30,000	30,000	35,000	40,000	40,000	45,000
Limit, psi Notched	18,000	19,000	21,000	24,000	26,000	31,000
Modulus of Elasticity	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi
Machinability Speed HSS	160	135	135	135	120	80
Index[4] Carbide	400	230	230	400	325	310
Type of Heat Treatment	Annealed	Normalized	Normalized	Normalized and Tempered	Normalized and Tempered	Quenched and Tempered

* Summary of Steel Castings Specifications available at Steel Founders' Society of America, Cleveland.

[1] Below 8 per cent total alloy content.

[2] There are commercial cast steels available at tensile strength levels greater than 200,000 psi. Properties must be checked with the producers.

[3] Test values obtained in accordance with ASTM testing procedures. (Relatively large castings show lower ductility values.)

type of design information, here is a quick reference table prepared by the Steel Founders' Society of America, supplementing the society's more complete summary of steel castings specifications, for general engineering purposes. Arranged by tensile strengths, the table enables design engineers to select a casting material that will meet the particular service requirements set up by the job at hand.

• Here's how the proper application of the specifications resulted in important, or even dramatic improvements for users. Service conditions were the basis for determining the alloy to be tried.

The hammer shown was originally made of manganese steel; it was designed for crushing large pieces of shale for cement manufacture. Manganese steel hardens on impact, so was a reasonable first choice. But in service, it was learned that the impact was not enough to develop the hardening action needed. So Massillon Steel Casting Co., Massillon, Ohio, rejecting other cast metals because they were too costly or failed in service, redesigned the hammer as two castings. The body, to combine strength and impact re-

Classified According to Tensile Strengths

ENGINEERING GRADES—LOW ALLOY STEELS[1]

65,000	70,000	80,000	90,000	105,000	120,000	150,000	175,000	200,000[2]
Low temperature service; high temperature service	Excellent weldability; medium strength with high toughness and good machinability; high temperature service		Certain steels of these classes have excellent high temperature properties; deep hardening properties; high resistance to impact; good low temperature properties; deep hardening; excellent combination of strength and toughness			Deep hardening, high strength, wear resistance, fatigue resistance	High strength, wear resistance, high hardness, high fatigue resistance	
ASTM: A352-60T LC1, LC2, LC3 ASTM: A217-60T Class WC1 MIL-S-8708	ASTM: A217-60 WC4 WC5 WC6 WC9 MIL-S-15464B Classes 1, 2, and 3	ASTM: A148-60 80-40 80-50 SAE: Automotive 080 Federal: QQ-S-681d Class 80-50 Military: MIL-S-15083B Class 80-50	ASTM: A148-60 90-60 ASTM: A217-60T C5 SAE: Automotive 090 Federal: QQ-S-681d Class 90-60 AAR: M201-47 Grade C Military: MIL-S-15083B Class 90-60	Federal: QQ-S-681d Class 105-85 Military: MIL-S-15083B Class 105-85 ASTM: A148-60 Class 105-85 SAE: Automotive 0105	ASTM: A148-60 120-95 SAE: Automotive 0120 Federal: QQ-S-681d Class 120-95 MIL-S-15083B Class 120-95	ASTM: A148-60 150-125 SAE: Automotive 0150 Federal: QQ-S-681d Class 150-125 MIL-S-15083B Class 150-125	ASTM: A148-60 175-145 SAE: Automotive 0175 QQ-S-681d Class 175-145	None specified
65,000	70,000	80,000	90,000	105,000	120,000	150,000	175,000	200,000
35,000	45,000	50,000	60,000	85,000	100,000	135,000	152,000	170,000
32	30	24	22	20	16	12	9	6
55	52	50	46	45	42	30	25	17
120	149	170	187	217	248	317	363	400
40	35	30	26	23	20	14	10	——
60	57	52	45	60	50	35	28	20
20	25	20	15	18	16	10	6	——
18	30	25	20	35	32	15	12	10
32,000	34,000	40,000	43,000	53,000	58,000	64,000	77,000	75,000
20,000	21,000	24,000	28,000	31,000	37,000	42,000	50,000	48,000
30 million psi	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi	30 million psi
130	120	110	95	90	75	45	35	——
400	230	240	290	310	180	200	180	——
Normalized and Tempered	Normalized and Tempered	Normalized and Tempered	Normalized[6] and Tempered	Quenched and Tempered	Quenched and Tempered	Quenched and Tempered	Quenched and Tempered	Quenched and Tempered

[4] Machinability speed index for a standard 18-4-1 high speed steel tool is based on cutting speed which gives 1 hour tool life. For carbide (78B) cutting speed for 1 hour tool life based on 0.015 in. wearland.

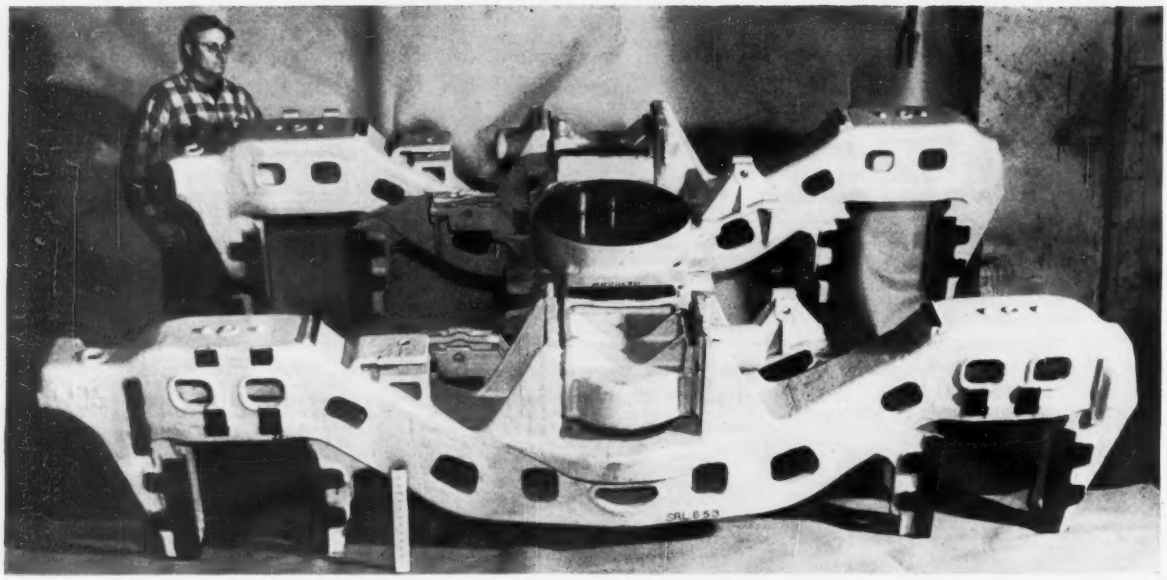
[5] A normalized and tempered steel will produce 15 ft-lb minimum.

[6] Quench and temper heat treatments may also be employed for this class.

sistance, was made of ASTM A 27-60, Class 60-30, cast steel. The wearing end of the hammer used ASTM 148-60, Class 175-145, cast alloy steel. It is water quenched and tempered to 375-400 Bhn. A bolt holds the face to the hammer body. Replacement of the wearing face—rather than the entire hammer—is quick and simple. And hard facing can be used in case local conditions require it.

A change by Ohio Steel Foundry, Springfield, Ohio, from a modified SAE 8730 to a modified 4330 steel, meeting the QQ-S-681D, Class 150-125 requirements, and some minor design changes produced a complicated bulldozer casting that holds the blade. It takes shock, low ambient temperatures, does not crack during heat treatment, and passes radiographic and Magnaflux tests. Out of 1000 cast, not one was rejected by the military, which placed the order, the company reports.

The ordnance group also had help from the Ohio foundry in designing steel castings for parachute brackets, bump stops, towing brackets, and suspension hubs for airborne vehicles. The need was for weight savings, high strength,



Railroad truck casting is produced as a single piece. Choice between two standard alloys is determined by service conditions

These pouring fonts give 20 times the service life of the originals, because improved design was coupled with proper alloy selection

Better choice of material meant a fourfold production bonus with this crusher head

and shock resistance. Also important: Good machining characteristics and weldability for battlefield repairs. A low alloy, weldable steel exceeding the QQ-S-681D specifications was chosen.

Crushing a highly abrasive ferroalloy was the problem of a customer of Ross-Meehan Foundries, Chattanooga, Tenn. Crusher heads made of ASTM A148-60, Class 105-85 steel produced 250,000 lb of crushed product per head. A change to the company's Dynalastic 120 steel, ASTM A148-60, Class 120-95, hiked production to 374,000 lb on the first trial. Some changes in design were made to enable better use of the alloy; now usage of nearly 1 million lb is routine for these heads. Operating temperature ranges between −20 and 120° F in service.

A railroad truck frame, produced as a single piece casting by LFM Mfg. Co., Atchison, Kans., is made from a modified ASTM A27-60, Class 65-35 steel for normal use. For higher strength, ductility, and low temperature impact properties, the steel used is ASTM 148-60, Class 80-50, containing 2 to 2½ per cent nickel.

Pouring fonts had been cast from iron or semisteel for a customer using them to carry refractory material from ladle to mold. Changes, including a shift to ASTM A216-60T WCA, meant 20 times greater service life with substantial savings to the customer, reports Ohio Steel Foundry. Part of the improvement which extended life from 60 to 1300 cycles is attributed to improved design that aids heat transfer.

A cast tool steel, used in an abrader arm for a wood pulp machine, was supplanted by ASTM, A148-60, Class 60-90, steel, says American Cast Iron Pipe Co., Birmingham. It was chosen to resist abrasion and impact.

The same company changed from ASTM A27-60, Class 60-30, to ASTM A148-60, Class 120-95, for a tapered mandrel. The mandrel is made of four, centrifugally cast tubes that are joined by threading. Longer service, better abrasion resistance, and fewer joints were the advantages.

fu′tur-i-za-tion, (fū′tŭr-ĭ-zā-shŭn), *n.* **1.** To reject the traditional and conventional. **2.** To plan or equip for more than the requirements of the immediate present; beyond the ability of the traditional or conventional.

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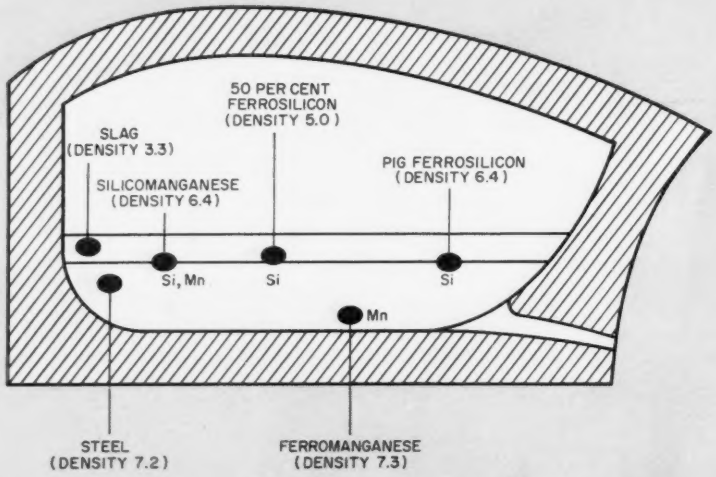


Silicomanganese and ferrosilicon, with densities between those of slag and steel, penetrate the slag and dissolve at the slag-metal interface. Standard ferromanganese, slightly heavier than steel, settles to the bottom of the furnace

Silicomanganese Helps Produce Cleaner Steels

• IMPROVEMENTS resulting from blocking with silicomanganese are important not only in steels made to close quality standards, they promise low cost upgrading of all steels.

The benefits offered producers and users of steel insure continued growth in the popularity of the compound as a blocking alloy, in the opinion of F. E. Van Voris, metallurgical engineer, Metallurgical Service Div., Cleveland, of Union Carbide Metals Co., a division of Union Carbide Corp.

"The alloy helps improve internal and surface quality of steels over a wide range of carbon analyses. Other advantages, evident in the melt shop—such as reduced furnace time, better recovery of alloy elements, and less difficulty in producing ongrade heats—help hold down production costs," says Mr. Van Voris.

Inclusions are said to be fewer in steels produced with silicomanganese blocking. And they're less objectionable types. The alloy helps reduce undesirable oxides, which lower mechanical and fatigue properties and produce poor rolling and forging characteristics. It also helps produce sound ingots with good surface quality. (That helps hold down conditioning costs and increase yield.)

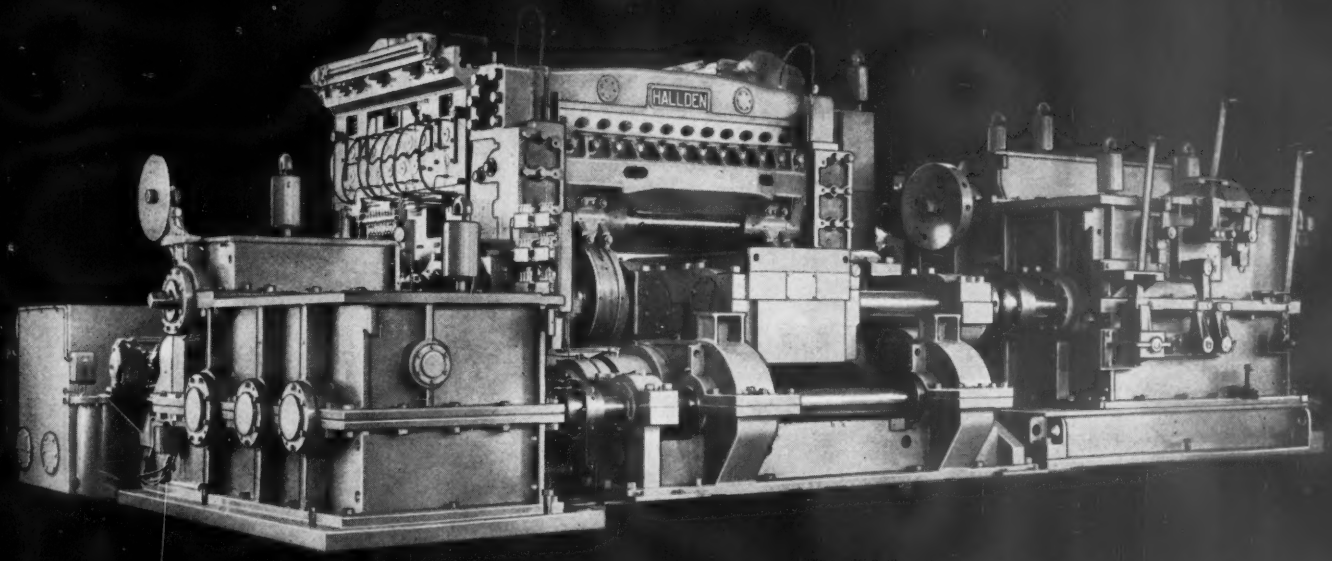
• Blocking stops decarburization, so the heat is quiet for analysis and tapping.

In all steelmaking processes, the primary chemical reaction removes carbon from the bath by oxidation. Carbon monoxide bubbles up from the furnace bottom and into the furnace atmosphere. The "carbon boil," as the bubbling is called, equalizes bath temperature, speeds secondary reactions, and eliminates bath inclusions fairly early in the refining period.

The boil must be stopped before the furnace is tapped, to finish the heat close to analytical specifications. A silicon bearing alloy is usually added to the heat to stop the boil, or block the heat. Result: The silicon ties up available oxygen so it cannot react with carbon. Carbon content is held constant until tap time.

The block should last through carbon analysis and tapping of the heat. It should not let the carbon boil resume.

The block also permits the melter to make large furnace additions of other oxidizable elements, such as manganese or chromium. When the elements are added with the blocking alloy or immediately afterward, uniform recoveries can be expected,



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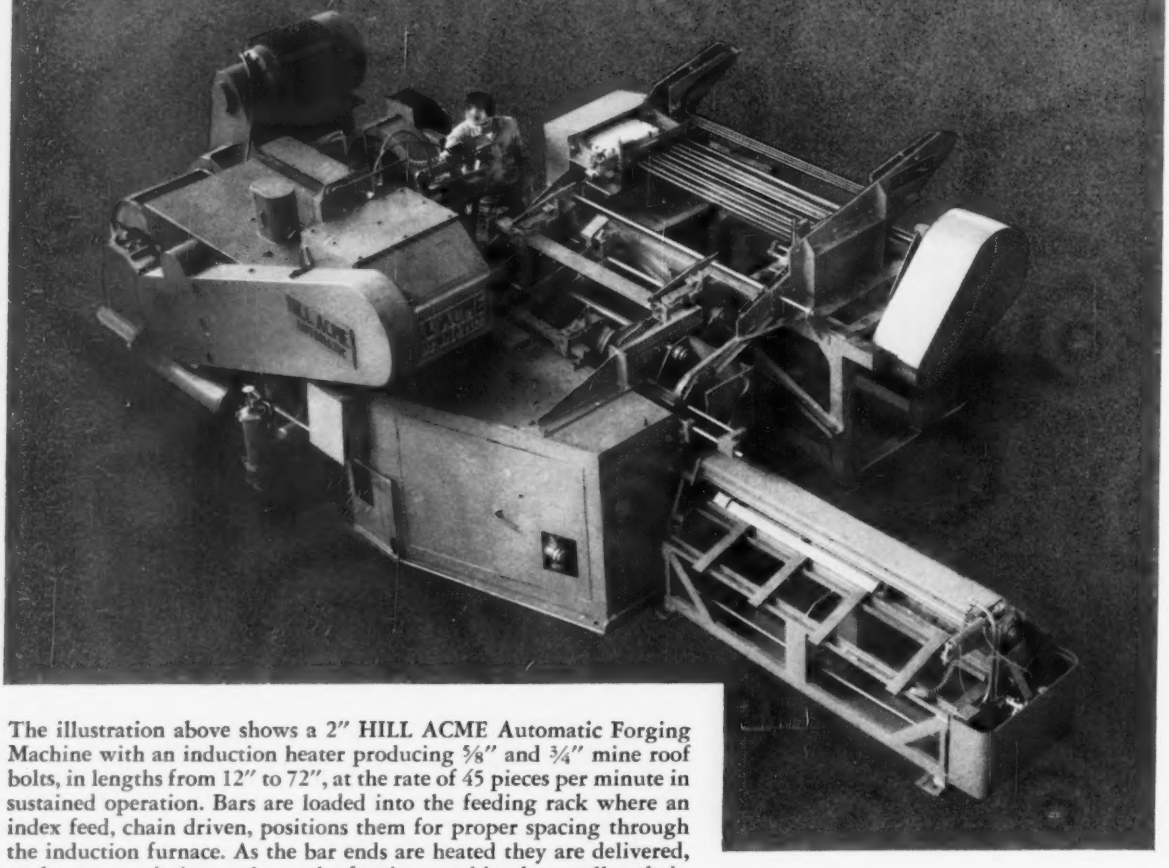

The illustration above shows a 2" HILL ACME Automatic Forging Machine with an induction heater producing 5/8" and 3/4" mine roof bolts, in lengths from 12" to 72", at the rate of 45 pieces per minute in sustained operation. Bars are loaded into the feeding rack where an index feed, chain driven, positions them for proper spacing through the induction furnace. As the bar ends are heated they are delivered, at the proper timing cycle, to the forging machine by a roller chain feed where they are gauged for length, picked up by fingers and passed progressively through the dies. Finished forgings are discharged from the back of the machine by means of a separately driven conveyor, arranged for both right and left hand discharge.

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and ongrade heats can be made consistently.

• Deoxidation with silicomanganese is said to be faster and less expensive than other methods.

Today's blocking methods are simpler, more economical, and require less furnace time than those used in the past, says Mr. Van Voris. Blocking time is much shorter, because many shops can obtain a laboratory check on carbon analysis in about 5 minutes vs. 30 to 40 minutes by older methods. Such time savings have helped cut blocking costs.

Silicomanganese helps reduce over-all alloy cost by providing the two blocking additions in one alloy. It goes into solution and stops the boil quickly (and that saves blocking time). In tests at Union Carbide Metals' laboratories, 1 per cent manganese, added at 2900° F as silicomanganese, dissolved 50 per cent faster than a similar manganese addition made with standard ferromanganese and 50 per cent ferrosilicon.

• High deoxidizing power provides longer lasting blocks.

The alloy is said to lower oxygen content of the bath more than straight silicon alloys and to block the heat for a longer time. Reason: Silicon and manganese decrease oxygen solubility more than silicon alone.

When silicomanganese is added to the furnaces, it reduces the bath oxygen content to a point below the carbon-oxygen equilibrium. Before the carbon boil can resume, enough oxygen must be transferred from the slag to the bath to bring oxygen content back above that equilibrium. The greater the reduction in available oxygen, the longer the block will last.

• Low carbon content allows heats to be tapped at higher carbon levels. That helps reduce furnace time and improves steel cleanliness.

Carbon introduced by silicomanganese is said to be negligible; its removal requires no extra furnace time. But separate silicon and manganese additions are said to add more carbon, and to make necessary an extra lowering of the bath carbon level before blocking. That extra decarburization may amount to as much as 6 points (0.06 per cent).

Bath oxygen content is said to be controlled by carbon before blocking and to vary inversely with tap carbon analysis. Silicomanganese is said to reduce bath oxygen. And low bath oxygen content is said to make for ingots with improved internal cleanliness and surfaces.

Effective stopping of the carbon boil gives the melter better control over final carbon content. Silicomanganese is said to provide more consistent carbon control, especially in the higher carbon ranges.

• The alloy allows more efficient addition of other oxidizable elements, such as manganese and chromium; it also improves analysis control.

Manganese recovery and control are greatly affected by the amount of oxygen transferred from the slag to the metal to react with the manganese. Strong deoxidizing power of the silicomanganese, concentrated at the slag-metal interface, helps maintain a low oxygen potential in the slag, and retards transfer of oxygen to the steel. That strong deoxidizing action is particularly important in low carbon heats, where bath and slag oxygen are at high levels, and manganese control is difficult.

• Alloy elements are delivered where they're needed; and segregation of deoxidizing materials isn't a problem.

Relative densities of different ferroalloys affect their behavior in the furnace. Example: Silicomanganese has a density between that of slag and liquid steel; it tends to dissolve close to the slag-metal interface, yielding silicon and manganese for effective deoxidation and reduction of slag-to-metal transfer.

Standard ferrosilicon is lighter than steel, but ferromanganese is heavier. So separate silicon and manganese additions yield silicon high in the slag-metal interface, and manganese at the furnace bottom. Result: Strong silicon-manganese deoxidation cannot occur until those metals diffuse and meet. Such diffusion is slow, and the segregation is probably one reason for poorer manganese recovery and control, said to be a shortcoming of separate additions.

Piston Quality Improved By Dual Center Chucking

A PROCESS that makes use of centers at both ends of the workpiece during machining and grinding is said to improve the quality of pistons made by Ohio Piston Corp., Cleveland. It was developed by the company for finishing operations on thin wall and conventional pistons made of cast iron, aluminum alloy, and Meehanite. It can be employed in the manufacture of pistons 1 to 18 in. in diameter, says the company.

The technique aids in the production of thin wall pistons, where finished head and wall thickness are critical.

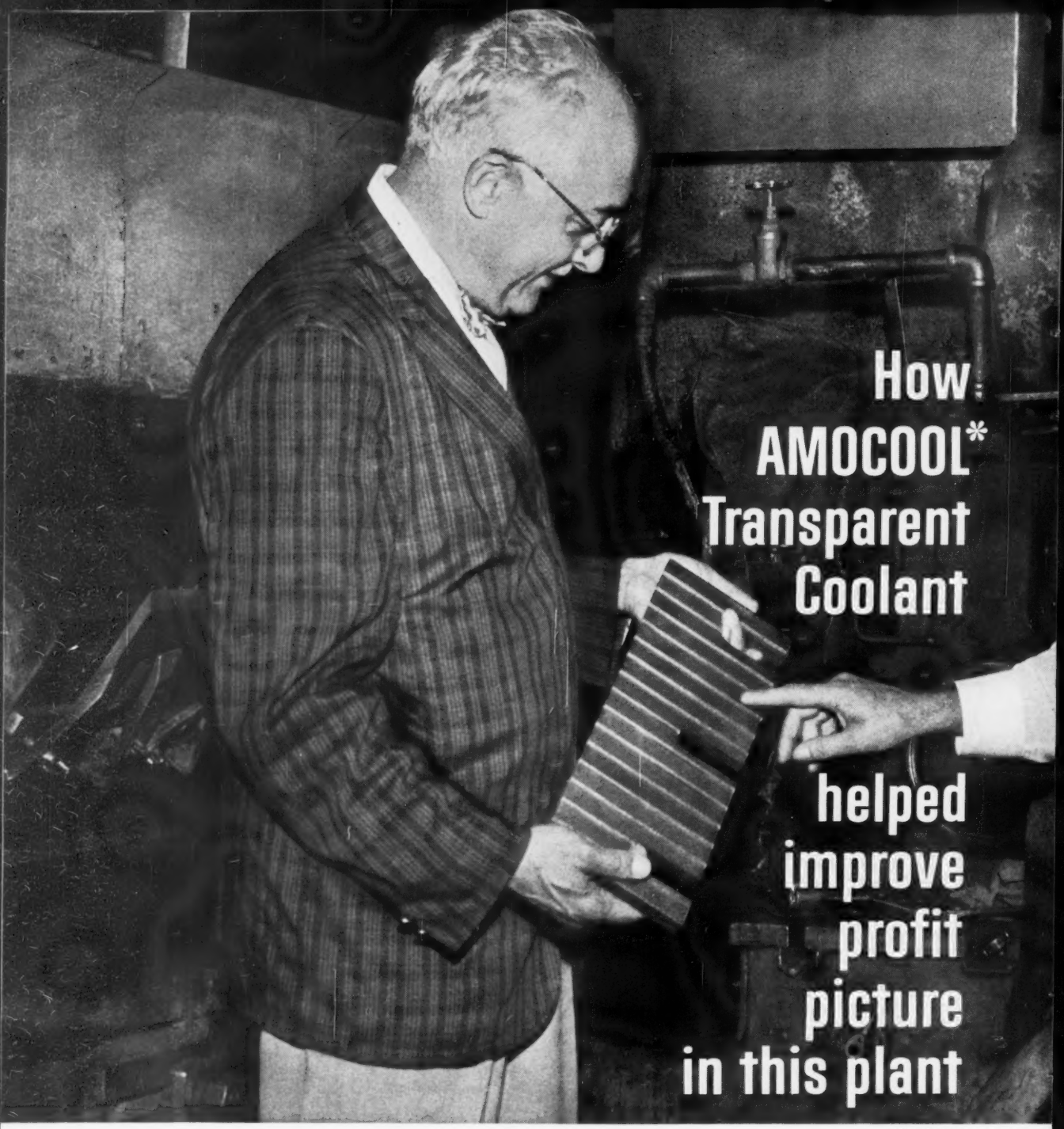
Here's an example: On a typical $7\frac{3}{4}$ in. diameter, thin wall piston, a thickness of $\frac{1}{8}$ in. at the head and 1/16 in. at the skirt isn't unusual. In such a case, wall thickness variation is held to less than 0.010 in. and runout is eliminated, the company says.

The same center locations serve as references for every operation. Result: Accurate concentricity of wall to grooves and crown. Wrist pin holes are said to be exactly parallel to the head and perpendicular to the wall.

Alignment and finish of wrist pin holes, which are through bored from one side of the piston, are accurately controlled, says the firm. It adds that special finishing processes provide a standard pin hole finish with about 100 per cent bearing surface.

Correction

In the article "Pneumatic Steel Processes Replace Old Open Hearths" (See STEEL, Sept. 25, pp. 150, 153), it was stated that license rights for the L-D process in the U. S. and Canada are held by Kaiser Engineers Div., Oakland, Calif., of Henry J. Kaiser Co. Dominion Foundries & Steel Co. Ltd., Hamilton, Ont., Canada, was the first user of the process in North America, and is the general licensor in Canada. License rights for the process in the U. S. were acquired by Kaiser Engineers in 1954.



How AMOCOOL* Transparent Coolant helped improve profit picture in this plant

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BY PAUL E. "PAPPY" STRATTON

About the Author. "Pappy" Stratton has been providing technical help on lubrication and metalworking problems to customers in the Detroit area for nearly all of the twenty-five years he has been working for the company. In addition to having this store of practical experience to help him, Pappy has completed the Company's Sales Engineering School.

* * *

By using a soap-base grinding compound, Detroit Edge Tool Company was getting excessive corrosion and rust on work and grinding machines. Oil vapor was collecting on machines and on the ceiling, causing dirty working conditions. Most important, high wheel loading was causing frequent down-time for wheel dressings.

We worked out a test program on AMOCOOL Transparent Coolant with the management. On our first test on one surface grinder, feed pressure was cut substantially while at the same time metal removal was increased.

Eliminate reworking because of rust, reduce wheel loading and extend intervals between wheel dressings; do these and you increase profit per unit, explains Detroit Edge Tool president, Dan Ebbing, to P. E. "Pappy" Stratton of American Oil. Plant manager, John Yonker (right) and Sam Vineh, operator, look on.

The cost of reworking parts to remove rust was eliminated. Time required to clean machines to get rid of the odor was cut in half. Less wheel loading and fewer wheel dressings have upped production and reduced costs. Our test program paid out in an improved profit picture. All grinding and drilling equipment has been converted to AMOCOOL Transparent Coolant.

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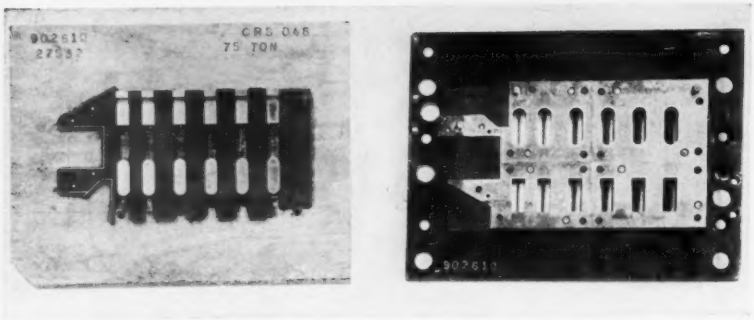
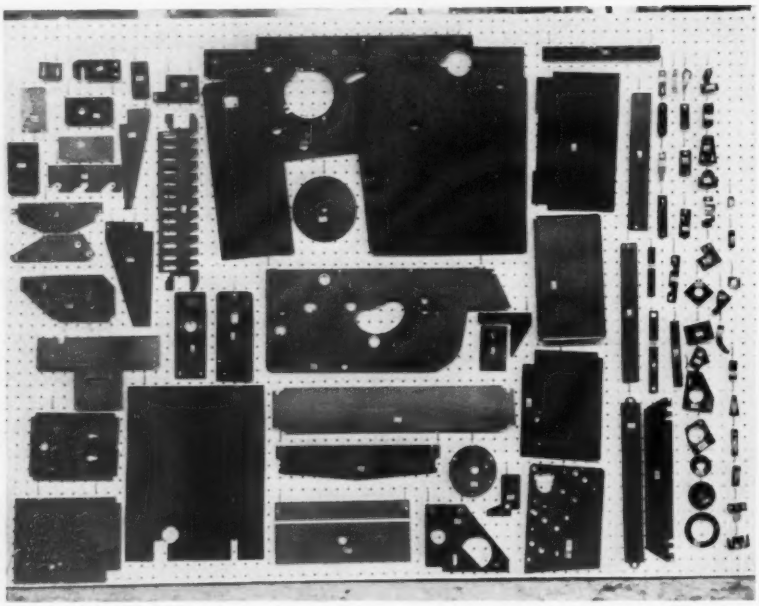


Steel Rule Dies Pare Costs On Short Stamping Runs



• STEEL RULE blanking and piercing dies show several benefits on short runs, says Malcolm A. Boa, supervisor of tool design, Ozalid Div., General Aniline & Film Corp., Vestal, N. Y.

1. The dies cost 50 to 75 per cent less than conventional all-steel types (for the same parts). 2. Virtual freedom from burrs cuts secondary operations.

• Most of the sheet metal parts for the Ozalid duplicating machines are produced with steel rule dies.

Starting with a high density laminated board (¾ in. thick), the division uses standard tools and a height gage to make a layout. Strips of steel rule (purchased in long lengths from Simonds Saw & Steel Co.) are beveled next to the cutting edge. Often, ends are beveled to fit together at inside joints. Slots for the rule lengths are then cut in the board with a jigsaw (thickness of cut is equal or slightly less than rule thickness to insure a tight fit).

For curved contours, the rule can be formed on a hand operated bender. When bending, the inside of the board serves as a master for checking radiuses and contours. In cases where it's impossible to form the rule to the desired contour, Mr. Boa suggests making a solid steel punch and inserting it in the board after hardening.

In addition to making blanking cuts, holes or narrow slots can be pierced by punches of suitable contour. Normally, both end faces of the punches are ground square after hardening. (The rear face is set flush with the back face of the board, leaving length equal to rule width.)

When the rules and punches are in place, neoprene blocks are set to act as strippers when the die is used. Two (or more) holes are drilled for guide pins that are placed in the die half. Rules and punches are components of the punch or top half of each die.

• Making the die half is simple.

Two steel plates (¼ in. thick) are used. The working plate, made of tool steel, is usually square or oblong. Portions where the rules come are cut to produce a mating contour. In some cases, the working plate of the die half can be shaped completely by using the punch half to shear the entire contour and to locate all holes. Mr. Boa says a punch half can easily shear ¼ in. tool steel in its soft state. Tool steel used in making the working plate of the die is soft when it is machined or sheared, but it is hardened before it is fastened to the back, Mr. Boa reports.

Registry pins (matching guide holes in the punch half) are applied to the die half as part of the assembly operation. Contours and holes of the die half portions that are sheared can be used without clearance, or clearance can be ground.

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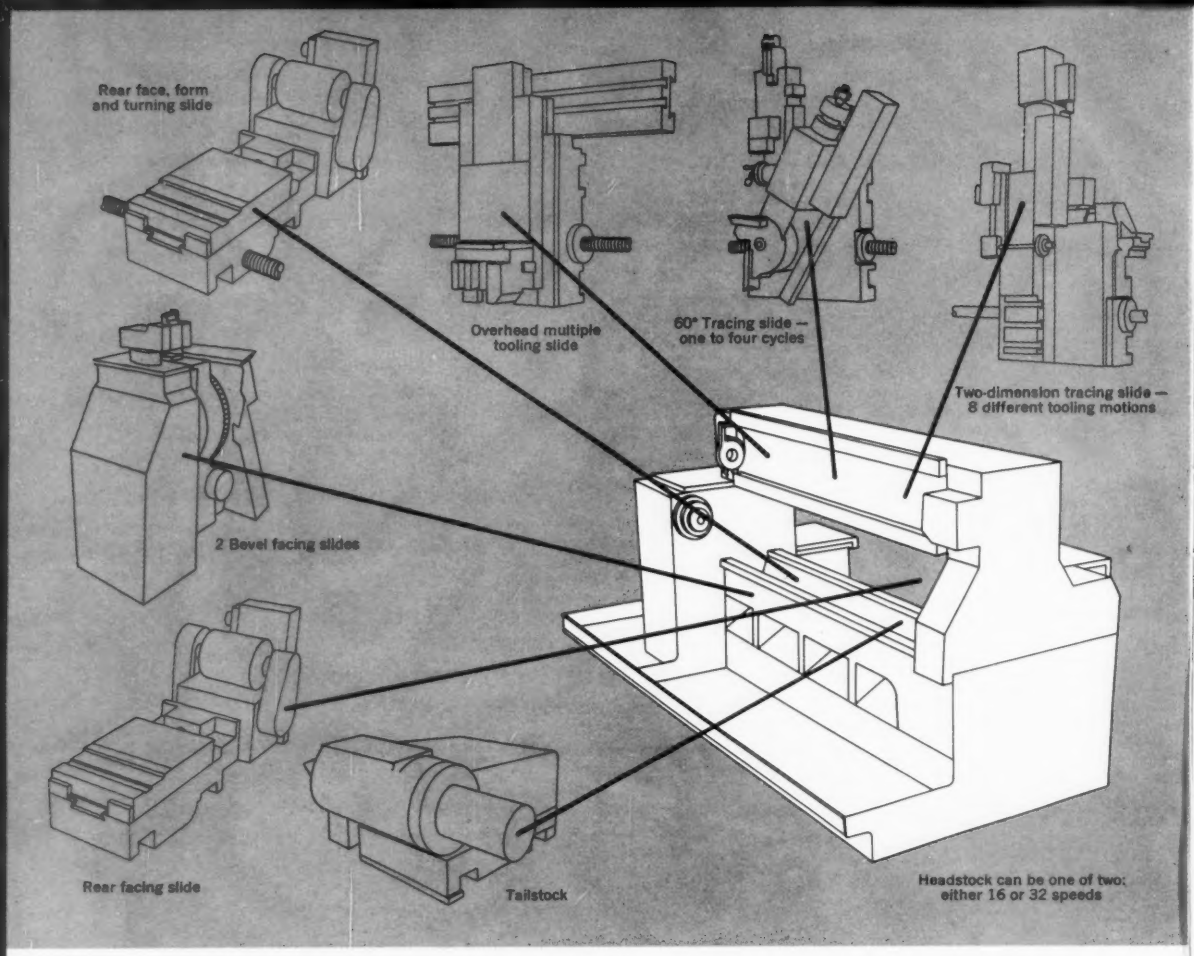
Rear face, form and turning slide
Overhead multiple tooling slide
60° Tracing slide — one to four cycles
Two-dimension tracing slide — 8 different tooling motions
2 Bevel facing slides
Rear facing slide
Tailstock
Headstock can be one of two: either 16 or 32 speeds

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The lower bed and pan are cast as a single unit, one end of the bed supporting the headstock, the other end holding a support column. An upper bed, parallel to the lower one, bridges the headstock and support column to tie all four elements into a single rugged unit. This unit receives the selected machine components, usually consisting of multiple-tool turning slides or tracer slides on the upper bed, and facing and forming slides on the lower one, with provision for a third slide on the front of the lower bed.

Both upper and lower beds have hardened and ground replaceable steel ways.

The pan extends beyond the headstock for mounting the hydraulic power unit, hydraulic control for the headstock, the main drive motor, electrical control cabinet and operator's control station. This permits moving or shipping the machine without partial disassembly, and all components are accessible for maintenance.

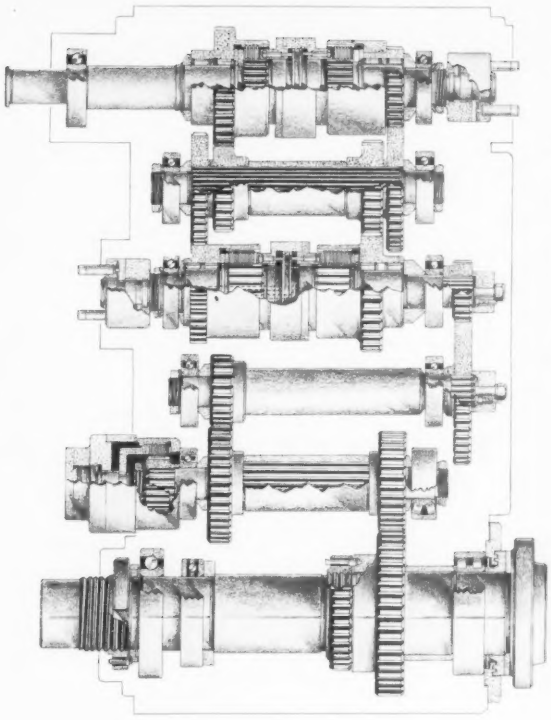
A coolant sump is provided in the pan, and a large unobstructed chip area is located in front of, and below the work zone. Chutes cast into the lower bed also return chips to the forward area. An automatic chip conveyor may be installed, or holes may be cast in the pan in the chip area, to accommodate sub-floor chip conveyors, if a central coolant system is used.

RUGGED HEADSTOCK

The headstock is a rugged, box type, one-piece casting rigidly supporting all transmission shaft and spindle bearings. The spindle rotates clockwise and

is supported by a double-row, staggered roller front bearing with tapered inner race for removing all looseness. An angular contact ball bearing supports the back end of the spindle, with a ball thrust bearing mounted ahead of it, to take thrust loads from the cutting tools and tailstock center. A torque test is applied to the spindle assembly which provides for running all spindle speeds without further bearing adjustment.

The *four-speed headstock* permits automatic speed change during cut between four spindle speeds. The ratio between the low and the three higher speeds is approximately 1:1.5, 1:2.5, and 1:3.5. Change gears make 32 spindle speeds available, ranging from 137 to 3013 RPM with a 6″ spindle, and 87 to 1910 RPM with an 8″ spindle and 44 to 956 RPM with an 11″ spindle nose.



ADVANCED-DESIGN TAILSTOCK

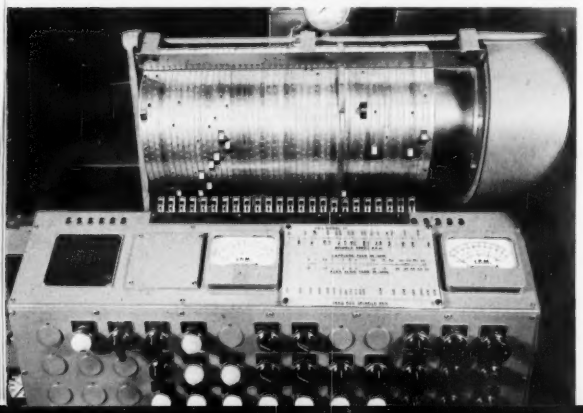
The tailstock for the Multiple Slide and 60° Auto-Tracer models mounts on the steel rails of the lower bed and is positioned by an adjusting screw. It extends over the front of the bed to bring the work axis 42″ from the floor, within elbow reach of the operator (16″ from spindle center line to outer edge of machine). It also provides a large unobstructed area in front of, and below, the work zone for automatic handling devices.

The tailstock can accommodate a work support for loading. Its 6″ roller bearing ram advances and returns hydraulically.

EASY-TO-HANDLE CONTROLS

The operator's control station permits the programming of the sequence of machine operations within an automatic cycle. This is under a manual procedure during the set-up period. After the entire sequence is established, a selector switch converts it into a completely automatic cycle. The station carries all push buttons and selector switches for the complete programming and is mounted on the front of the headstock, within easy reach of the operator.

A control drum at this station with adjustable dogs for obtaining the desired sequence of functions, including speed and feed changes, rotates in conjunction with the turning carriage motion. As the drum rotates, the various dogs trip appropriate micro switches within the control station to initiate the various machine functions in their proper sequence.



A knife edge carrying the numbers of all the dogs, together with graduated adjustable dog mounting rings, allows the recording of a complete operation after the initial set-up has been made. This reduces the set-up time required when the same job is to be run again. Feed and speed changes for turning, tracing, and facing slides are made by means of potentiometers mounted in the control station together with meters indicating the rate of feed in inches per minute. (Feed and Speed changes for the 180° Tracer are controlled through solenoid operated directional valves.) A conveniently located chart converts the feeds from inches per minute to thousandths-per-spindle-revolution. The feed control for the hydraulically-operated former slide for the turning slide is through hydraulic flow control when this slide is used for facing, either alone, or in conjunction with turning.

Indicating lights glow as the electric circuits are made for the different rates of feed for both turning and facing slides.

Being able to change speeds and feeds at any time during an operation allows the use of efficient speeds and feeds for producing quality work in a minimum amount of time.

Automatic lubrication for the entire machine is provided by splash, gravity or force feed; except for the tailstock ram, which is manually lubricated.

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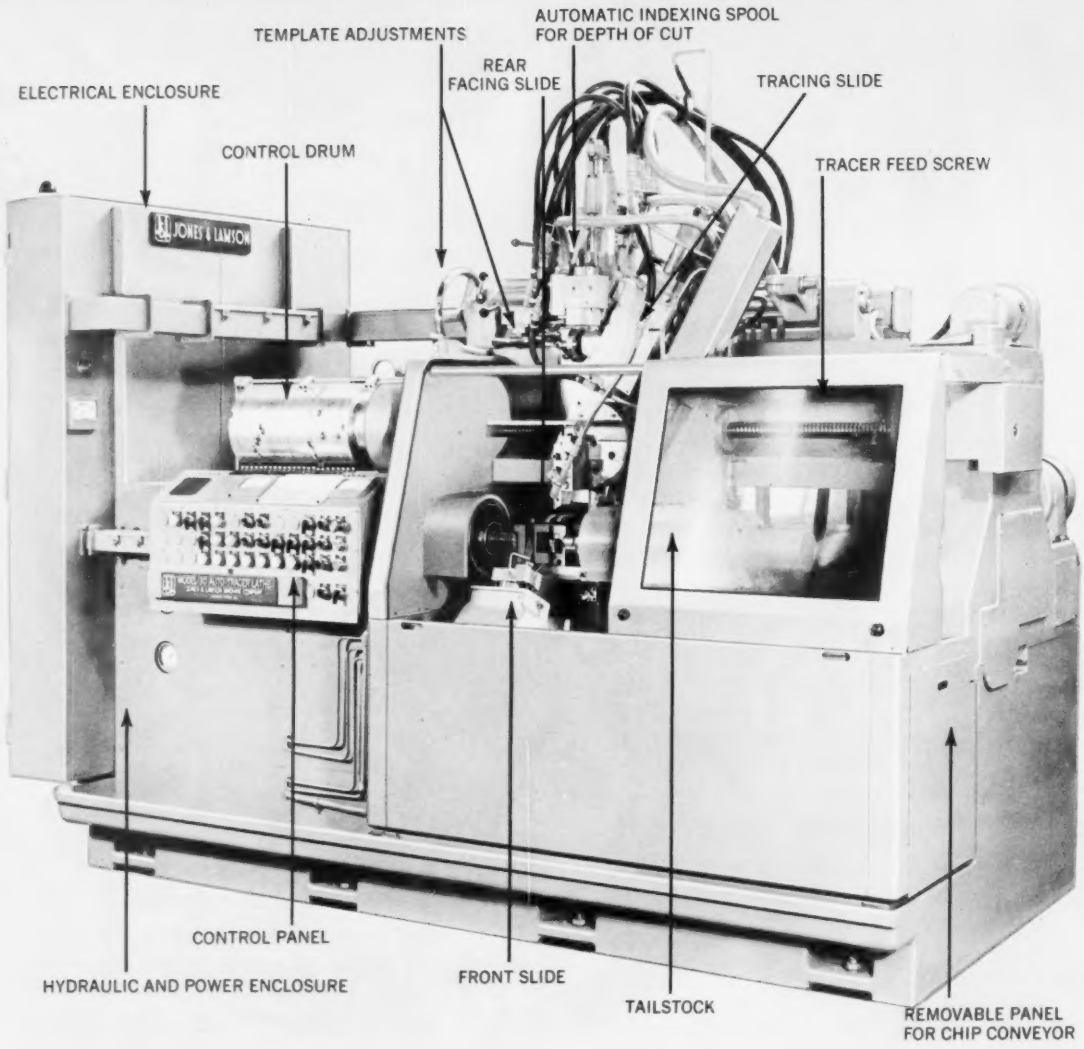


Model 30-60° Auto Tracer Lathe . . . . . .

This single-spindle Automatic Lathe is a compact, rugged, well-designed machine with readily-accessible components for ease of operation.

Its bridge-bed design allows for a combination of a broad variety of machine components, with ample room for tooling loading and chip removal. Versatility of application is its stock in trade. It is abundantly powered, and takes full advantage of the latest developments in carbide cutting tools and tips.

Among the standard features available to meet your specific requirements are a wide range of spindle speeds ranging from 44 RPM to 3162. Infinitely variable feeds are available in four ranges from 1.50″ to 40″ per minute with standard gears. Additional gears available for feeds from .8″ to 75″ per minute.

Also, you can have as many as four different tracing cuts in a single machining cycle, with up to four different speed changes and four different feed changes occurring automatically during each of the cuts.

In addition, there are three bed lengths available (24″, 48″ and 72″ between centers); three headstock spindles (6″ A-1 ASA nose, 8″ nose, and 11″ A1); two headstock transmissions (two- and four-speed automatic speed change mechanisms); 60° overhead tracing slides with either single or 2-position indexing tool holders; facing and forming slides; universal face, form and turning slides; two slides for angular work (one light-duty and one heavy-duty); and a template mount that accommodates both round and flat templates.

. . . Provides Added Capabilities for this Job

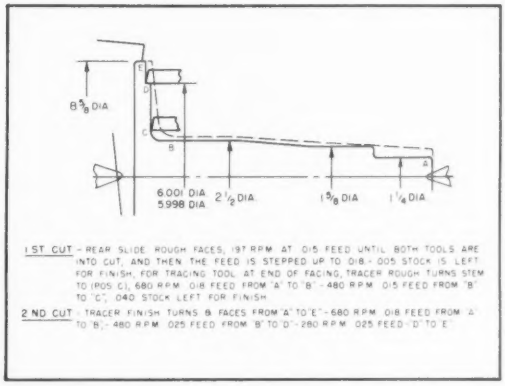
Here is how one version of the J & L Model 30 Auto-Tracer Lathe machines steering knuckles for a leading truck manufacturer.

This particular set-up has a single dimension, or 60° Tracing Slide on the upper bed, with a tailstock and rear face and forming slide mounted on the lower bed.

The schematic diagram shown here will give a good idea of how these two machining components combine with automatic speed and feed change during a cut to provide a fine finish, close tolerance and maximum tool life at a production rate of more than 15 pieces per hour.

The material is AISI-4140 forging 32-36 RC at a weight of 47 lbs.

The part is completed in two cuts during a single, fully automatic machining cycle.



1 ST. CUT - REAR SLIDE ROUGH FACES, 197 R.P.M. AT .015 FEED UNTIL BOTH TOOLS ARE INTO CUT, AND THEN THE FEED IS STEPPED UP TO .018 - .005 STOCK IS LEFT FOR FINISH. FOR TRACING TOOL AT END OF FACING, TRACER ROUGH TURNS STEM TO (POS. C), 680 R.P.M. .018 FEED FROM "A" TO "B" - 480 R.P.M. .015 FEED FROM "B" TO "C", .040 STOCK LEFT FOR FINISH.

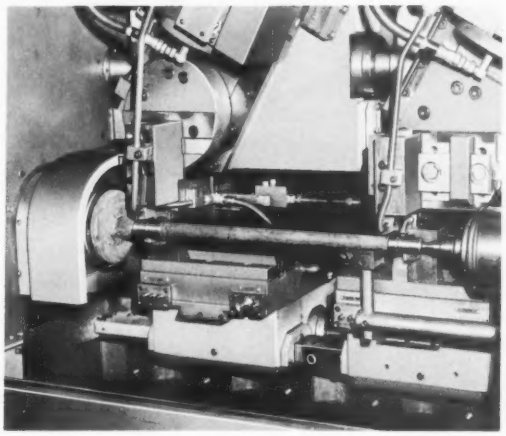
2 ND CUT - TRACER FINISH TURNS 8 FACES FROM "A" TO "E" - 680 R.P.M. .018 FEED FROM "A" TO "B" - 480 R.P.M. .025 FEED FROM "B" TO "D" - 280 R.P.M. .025 FEED "D" TO "E".

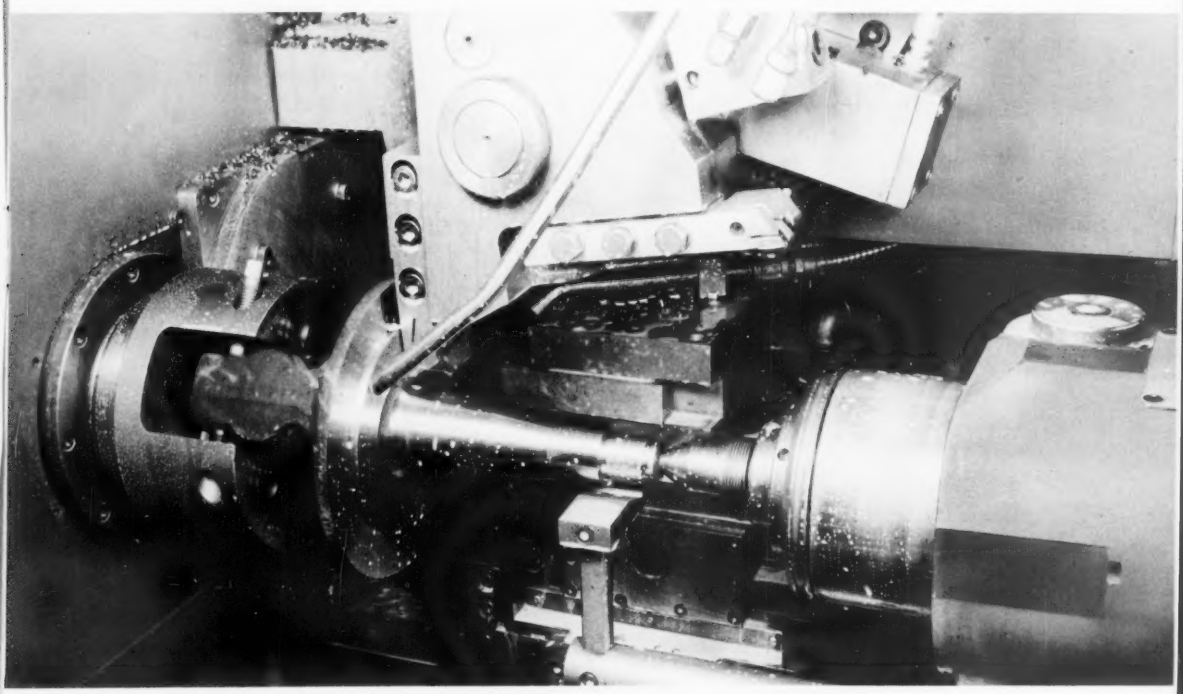
. . . and this

On this set-up, two rear turning slides and two 60° tracer slides are employed. The left rear slide carries a double controlled taper turner to rough the various diameters, while the rear slide on the right has a solid tool and rough turns straight.

The two 60° tracers finish turn both ends of the shaft after the rear slides have completed the rough turning.

The tooling on the flange end of the shafts remains in the same position when changing from one length shaft to another. However, stop blocks mounted on the right hand tracer slide and right hand rear slide, allow for fast change of tool block position when changing from one length shaft to another.





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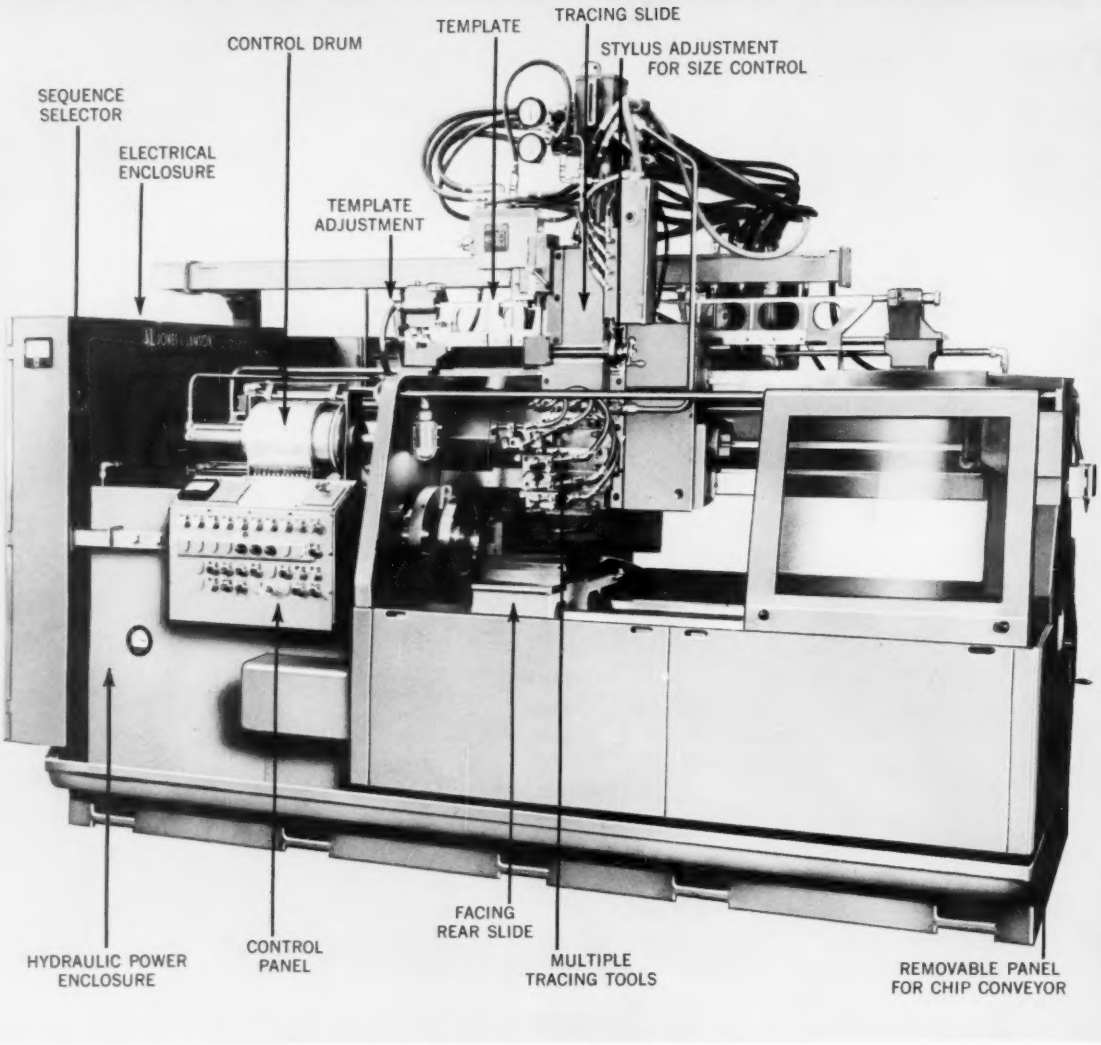


Model 30-2D Auto Tracer Lathe . . . . . O

fo

This Tracer Lathe utilizes the following major components to produce a machine with the necessary power, rigidity, and versatility required for a new tooling conception in the metal turning field.

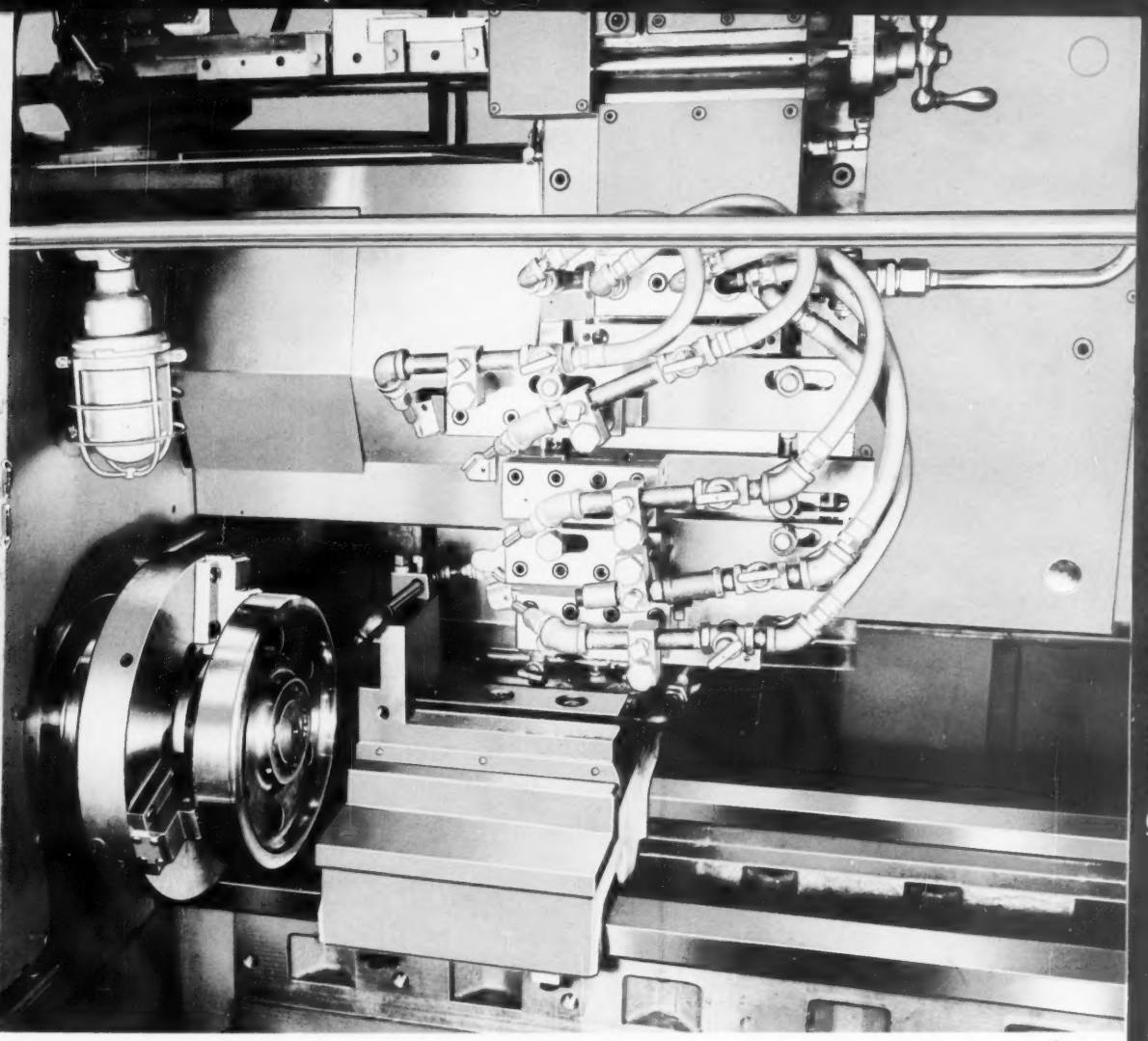
The headstock is arranged with a spindle having an 8″ or 11″ A1 spindle nose, and has a speed range from 44 to 1910 RPM with four sets of pick-off change gears. It is also arranged with hydraulic clutches and brake to provide automatically four different spindle speeds in a machine cycle, with a quick spindle stop at the end of the cycle. To accommodate the four spindle speeds, four different feeds are available. As many as eight speed and feed changes can be had in a single cycle, if necessary.

This machine is designed primarily for chuck work, thus it is not equipped with a tailstock. A facing and forming slide, rear turning slide and a front auxiliary slide are available for the lower bed when required.

The most important single feature of this machine is the 2D Tracing Unit (a Two-Dimension Tracer, sometimes referred to as a 180° Tracer). With this tracing unit and its controls, any one of eight different sequences of tool travel may be selected for multiple tooling through a full 180° of motion.

Two different bed lengths are available. Choice of bed lengths depends on the equipment required to handle the kind and amount of work to be accomplished in a single operation.

The machine is completely automatic in its operation after the work has been properly chucked and the machine cycle started. It has ample capacity for more than 30 HP main drive motor and, therefore, is powered for carbide.

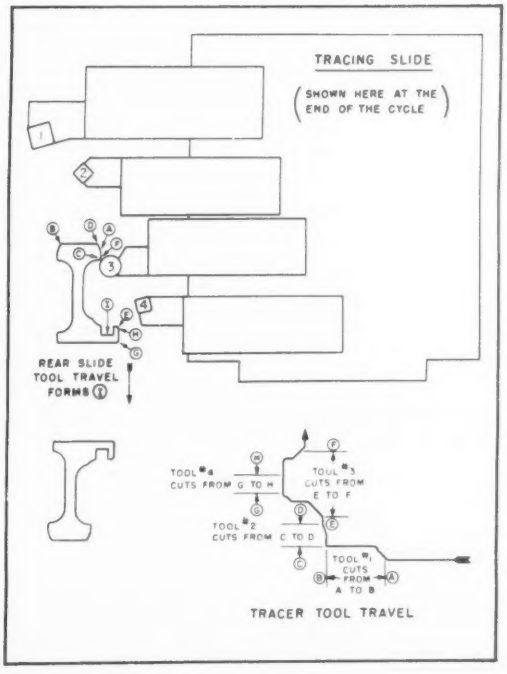


Offers Unique Versatility for jobs like this

Machining of gear blanks (illustrated at right) shows a single template providing tracer control for four tools. All cutting is performed in one fully automatic tracing cycle — including automatic feed and speed changes for optimum cutting conditions on varying surfaces.

Tool #1 turns the O.D. As this is completed, Tool #2 is in position to start contour facing the outer rim of the part. Tools #3 and #4 then come into the work at the same time. Tool #4 faces the hub of the part and at the same time Tool #3 contour faces the entire rim of the part.

A rear tool slide, mounted on the lower bed, performs the necking of the groove in the same automatic machining cycle.


TRACING SLIDE
(SHOWN HERE AT THE END OF THE CYCLE)
REAR SLIDE TOOL TRAVEL FORMS (T)
TOOL #4 CUTS FROM G TO H
TOOL #3 CUTS FROM E TO F
TOOL #2 CUTS FROM C TO D
TOOL #1 CUTS FROM A TO B
TRACER TOOL TRAVEL

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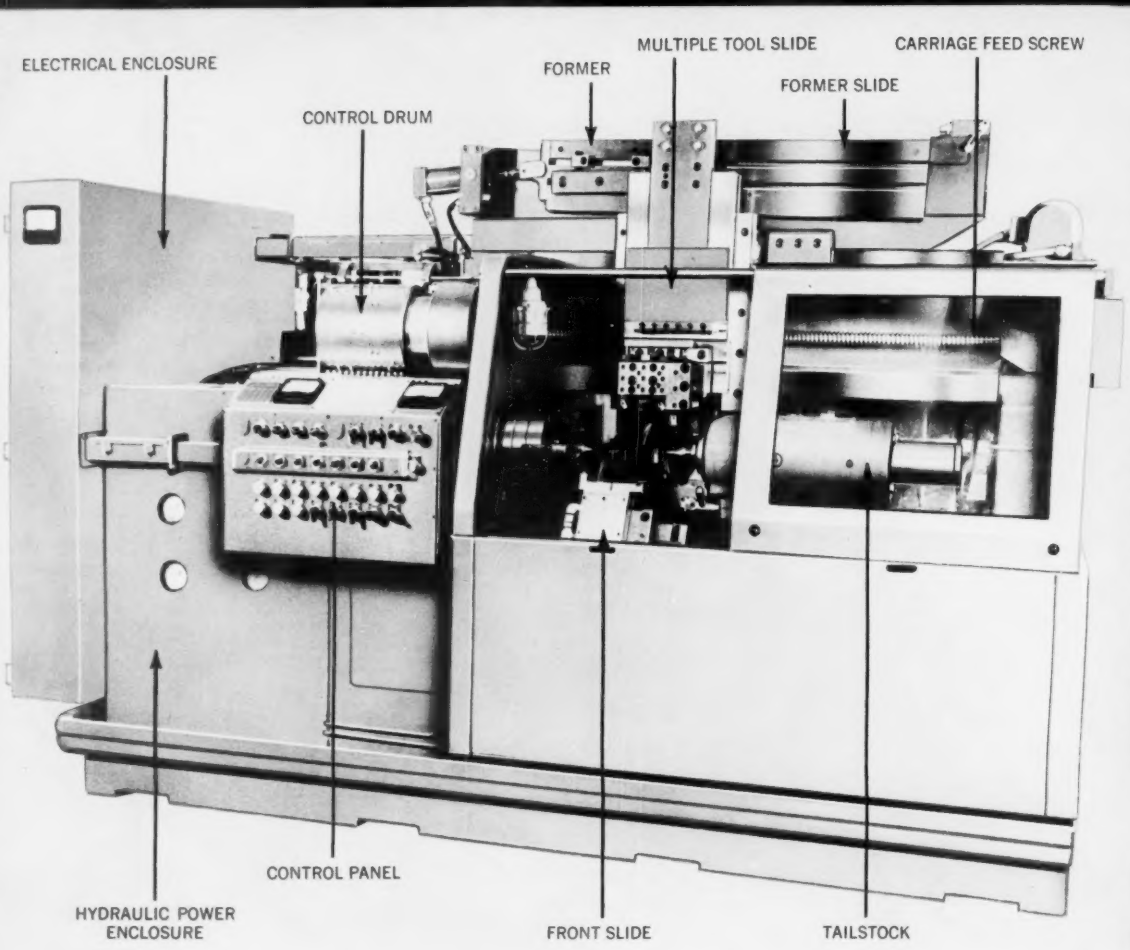


Model 30 Multiple Slide Automatic Lathe . . . . . .

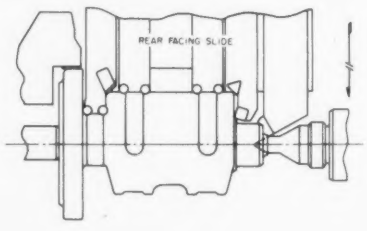
This new J & L Automatic Lathe is strictly a multiple-tool machine, basically arranged with an overhead turning slide, and a lower facing and forming slide. Provision is made for mounting auxiliary slides on the front of the lower bed.

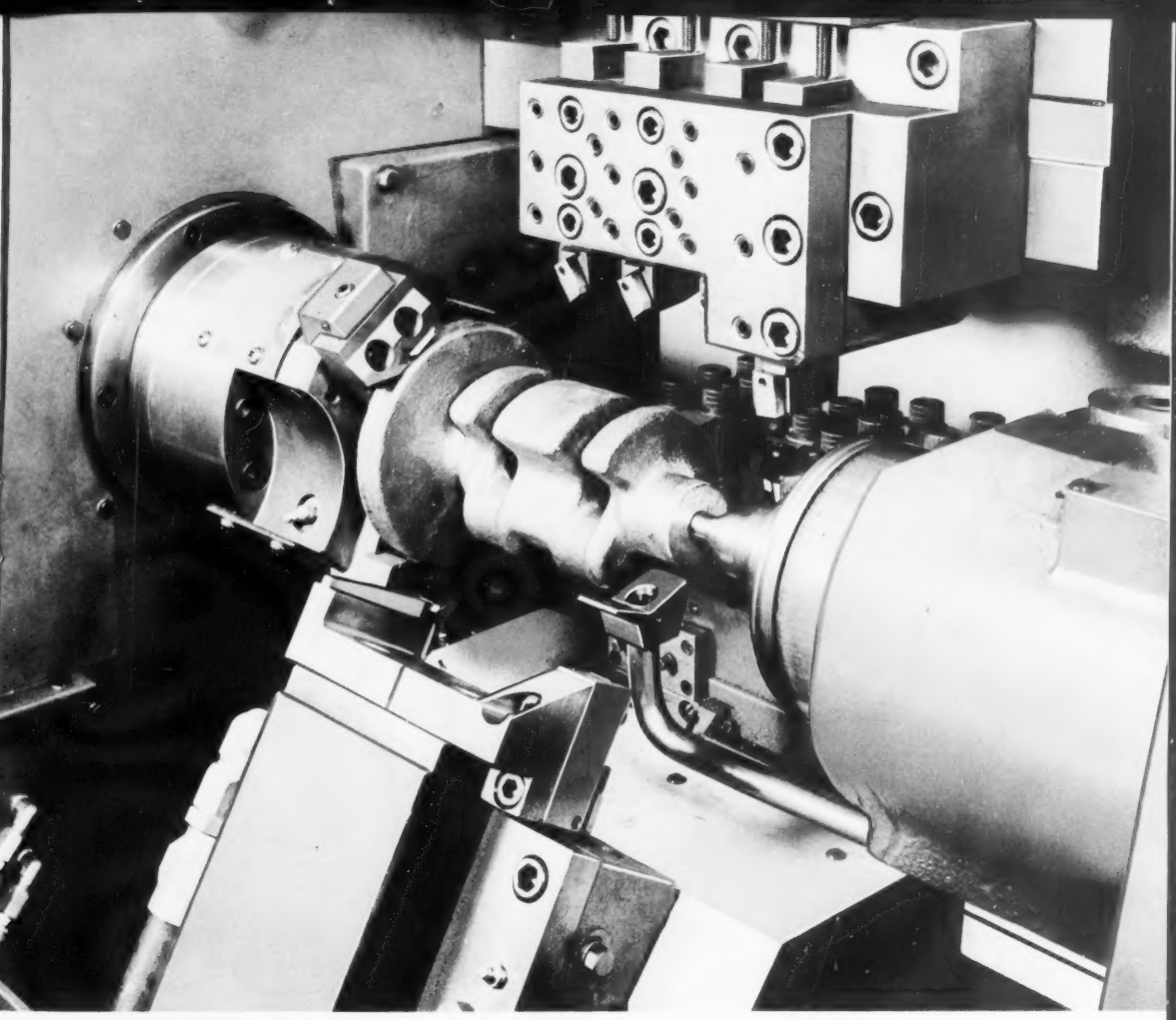
The headstock is arranged with a spindle having an 8", or 11" A1, ASA spindle nose and has a speed range from 44 to 1910 rpm, with 4 sets of pick-off change gears. It is also arranged with hydraulic clutches and brake to provide 8 different spindle speeds with a single pair of pick-off gears, and a quick spindle stop at the end of the machine cycle.

The machine is designed primarily for work supported on centers using a tailstock, but can be tooled to handle chuck work as well; in which case the tailstock is not used.

Machines can be arranged with more than one turning slide and more than one facing and forming slide. One or more auxiliary slides arranged for angular or straight work can be mounted on the front of the lower bed. The number or nature of all slides required is dependent on the length and nature of the parts to be machined.

Steadyrests are available for supporting shaft work as required. Two different bed lengths are available. The machines are completely automatic in their operation. They are powered for carbide with ample capacity for more than a 30 HP main drive motor.

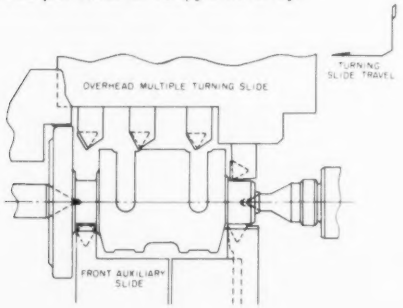




. . . . Steps up productivity on jobs like this

Here is multiple tooling on a Model 30 for the complete machining operation on an SAE 1046 forged steel crankshaft. First, the top slide turns the OD of the crankshaft throws at a feed of .009 and an rpm of 358. At the same time, the rear slide starts facing the flange. When the top slide tools clear, the rear slide tools complete the facing and forming cut.

Next, the front slide comes in, faces the balance of bearing end area, and finish-forms bearing surface. Total time, one piece, floor to floor — 1.7 minutes. 35 pieces per hour at 100% efficiency.



AUX. FRONT FACING SLIDE FLOW RATE — A8.3						
SPINDLE SPEED RANGE 87 TO 1910						
SPEED CHANGE GEARS 47T DRIVING 41T						
FEED CHANGE GEARS 36T DRIVING 54T (TOP SLIDE)						
FEED CHANGE GEARS 36T DRIVING 54T (REAR SLIDE)						
DESCRIPTION OF OPERATION						
Dia.	**Ft./Min.**	**R.P.M.**	**Feed**	**Time/Inch**	**Length of Cut**	**Minutes Required**
TOP SLIDE TURNS						
4.500	422	358	.009	.31	2.620	.81
REAR SLIDE FACES PORTION OF FLANGE (IN ABOVE TIME)						
6.260	585	358	.006			
REAR SLIDE COMPLETES FACING & FORMING						
		358	.006	.46	1.000	.46
AUX. SLIDE FACES & FORMS						
2.500	234	358	.006	.46	.500	.23
IDLE TIME						.100
TIME REQUIRED FOR CHANGING WORK						.100
TOTAL TIME ONE PIECE FLOOR TO FLOOR						1.70
PIECES PER HOUR AT 100% EFFICIENCY						35
PIECES PER HOUR AT 80% EFFICIENCY						28

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SPECIFICATIONS

	MODEL 30-60	MODEL 30-180	MODEL 30-MULTIPLE SLIDE
GENERAL			
Swing over rails	23" dia.	23" dia.	23" dia.
Swing over tracer slide (turning slide)*	13½" dia.	13" dia.	13" dia.*
Length between centers	24", 48", 72"	24", 48"	24", 48",
Max. Dia. Chuck	15"	15"	15"
Main Drive Motor	30 HP — 1800 RPM 40 HP — 1800 RPM	30 HP — 1800 RPM 40 HP — 1800 RPM	30 HP — 1800 RPM 40 HP — 1800 RPM
HEADSTOCK			
Spindle Nose	6" A-1, 8" A-1, 11" A-1	8" A-1, 11" A-1	8" A-1, 11" A-1
Hole through Spindle	1⅝", 2¾", 5¼"	2¾", 5¼"	2¾", 5¼"
Taper in Spindle Bore	¾" Per Foot	¾" Per Foot	¾" Per Foot
Spindle Speed Range	16 Speeds 115 RPM — 3162 RPM (6" A1 Nose) 73 RPM — 1830 RPM (8" A1 Nose) 32 Speeds 137 RPM — 3013 RPM (6" A1 Nose) 87 RPM — 1910 RPM (8" A1 Nose) 44 RPM — 956 RPM (11" A1 Nose)	32 Speeds 87 — 1910 RPM (8" A1 Nose) 44 — 956 RPM (11" A1 Nose)	32 Speeds 87 — 1910 RPM (8" A1 Nose) 44 — 956 RPM (11" A1 Nose)
TRACING UNIT (Turning Slide for Multiple Slide Machine)			
Angle with Spindle Center Line	60°	90°	90°
Turning Length	24", 48", 72"	24"	12" (Addit. Avail.)
Facing Length	4"	7"	2"
Infinitely Variable Feed Range	1.5" to 40"/Min.	1.5" to 30"/Min.	1.5" to 40"/Min.
Rapid Traverse	420"/Min.	360"/Min.	420"/Min.
REAR FACING & FORMING SLIDE			
Infinitely Variable Feed	1.5" to 40"/Min.	1.5" to 40"/Min.	1.5" to 40"/Min.
Tool Slide Travel	9", 12" or 15"	9", 12" or 15"	9", 12" or 15"
Rapid Traverse	200"/Min.	200"/Min.	200"/Min.
REAR FACE & TURNING SLIDE			
Facing Length	9", 12" or 15"	9", 12" or 15"	9", 12" or 15"
Turning Length	24", 48", 72"	24"	12"
FRONT SLIDE			
Light Duty: Total travel including feed and fast motion	5"	5"	5"
Graduated for 180° of manual rotation			
Heavy Duty: Manual radial adj.	4"	4"	4"
Total travel including feed and fast motion	5"	5"	5"
Graduated for 180° of manual rotation			

All gears and shafts are made from alloy steel, hardened and ground for precision operation. All transmission shafts run in anti-friction bearings.

Automatic speed and feed changes during a cut make proper surface footage automatically available on varying diameters. Tool life is increased, production is increased, accuracy and required finish are assured.

Speed changes are made hydraulically by multiple-disc clutches through constant mesh gears mounted on roller bearings. Spindle stop is by hydraulic multiple-disc brake.

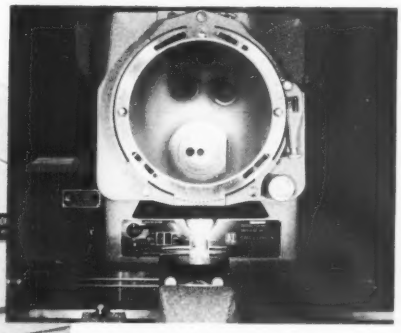
Various arrangements for the Model 30 may be equipped with either a two-speed headstock, or a four-speed headstock.

PRECISION MEASUREMENT FOR LARGE, HEAVY WORK AS WELL AS TINY PARTS*

Here is another brand-new Jones & Lamson Optical Comparator and Measuring Machine. Its unique feature is a work table supported on *two* heavy duty columns having 10 pitch hardened and ground lead screws, allowing fast, high precision measurements.

The new J&L FC-14ER provides a 10" lateral, 8" vertical measuring range. Spacious table top has two fixture slots and is 32" by 8". Roller bearings provide smooth, fast, accurate traverse. Lamp house on this large capacity comparator is adjustable for maximum throat clearance from 16" to 18" without obstruction to operator.

This new quality control tool has all the advanced design features of J&L Comparators. For example: J&L Telecentric Optical System requires no adjustments when changing magnifications. Electronic variable speed adjustment provides fingertip control for slow and fast positioning motions. And optional features such as the Normal Reflection Unit extend versatility even further. Get details. Write for Folder GL-6111.



Normal Reflection Unit provides maximum brightness, regardless of surface finish of part being inspected . . . even at high magnifications.

***Small Items Too**

Sometimes it is hard to make the best even better . . . but it is done here.

Although you can inspect the tiniest and lightest parts, with utmost precision, on this comparator — you can also handle the brute jobs to the same degree of accuracy. Extra capacity and rigidity make the awkwardly long, or quite heavy, objects easy to handle.

Send financing and leasing information plus catalogs containing complete information on:

- ☐ Model 30-60 Auto-Tracer
- ☐ Model 30-2D Auto-Tracer
- ☐ Optical Comparators
- ☐ Model 30 — Multiple Slide Auto-Lathe

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Company.....

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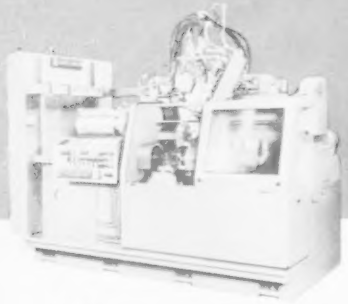
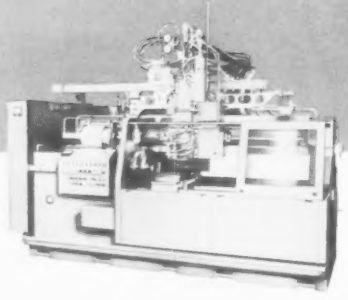
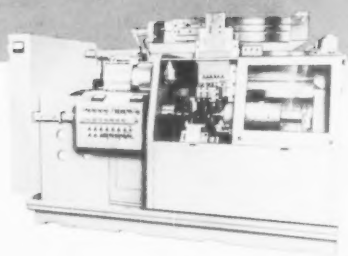
the man who needs
a new machine tool is
already paying for it







JONES & LAMSON'S NEW FAMILY OF MODEL 30 FULLY AUTOMATIC & TRACING LATHES

A "Building Block" Design that Meets Individual Requirements Precisely

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Tungsten Crystals Are Ductile

DUCTILE TUNGSTEN is one of the results of a research project at Westinghouse Electric Corp.'s Lamp Parts Dept. at Bloomfield, N. J.

C. O. Young, manager of the department, says his engineers have developed a practical method to produce large single crystals of tungsten —they are of high purity and density.

Tungsten rods 10 in. long and 0.2 in. in diameter are being produced as single crystals. Mr. Young revealed that special refining techniques make it possible to grow the crystals in predetermined forms with a purity of 99.9975 per cent. The crystals are big enough to permit the commercial fabrication of small parts.

• **Ductility**—Tungsten is usually considered a hard, brittle metal that's difficult to machine or fabricate. Ultrapure single crystals are actually ductile, says Westinghouse, even at temperatures as low as minus 330° F. Ductility depends on purity. The discovery, the company feels, points to the possibility of a major breakthrough in commercial fabrication.

To make the crystals, Westinghouse engineers put extremely pure tungsten ingots in a newly designed zone melting furnace that uses the electron beam to heat the metal.

Ironically, after the extreme high purity tungsten crystals were attained, Westinghouse engineers found that present analytical techniques were not adequate to obtain precise measurements of gases and metallic impurities when they are present in only a few parts in a million. As a result, advanced methods of optical spectroscopy, vacuum fusion, and neutron irradiation analyses were developed to verify the infinitesimal amounts of impurities.

Mr. Young says the single crystal tungsten is available commercially now.

Mr. Young feels that the availability of superior tungsten single crystals opens the door to advanced research, particularly in studies of fundamental properties of high temperature metals.

Heavy steel die receives conical preform. After it is lowered into water, explosive-actuated shock wave instantly molds metal to die. In this case, even the mirror die finish is reproduced

Explosive Forming Scores At General Dynamics

• A $40,000 "initiation fee" has made General Dynamics/Astronautics, San Diego, Calif., General Dynamics Corp., one of the beneficiaries of explosive forming technology.

A new facility built for that amount includes a 12 ft water tank, two buildings, a 5 ton hoist, and two explosive magazines in a 16,000 sq ft area. Parts 8 ft in diameter and 6 ft high can be accommodated. It will replace the present method of making bulkheads—trimming, hand fitting, and welding in one-of-a-kind fixtures.

"We expect that the explosive approach will lower tooling costs 40 per cent," says the company.

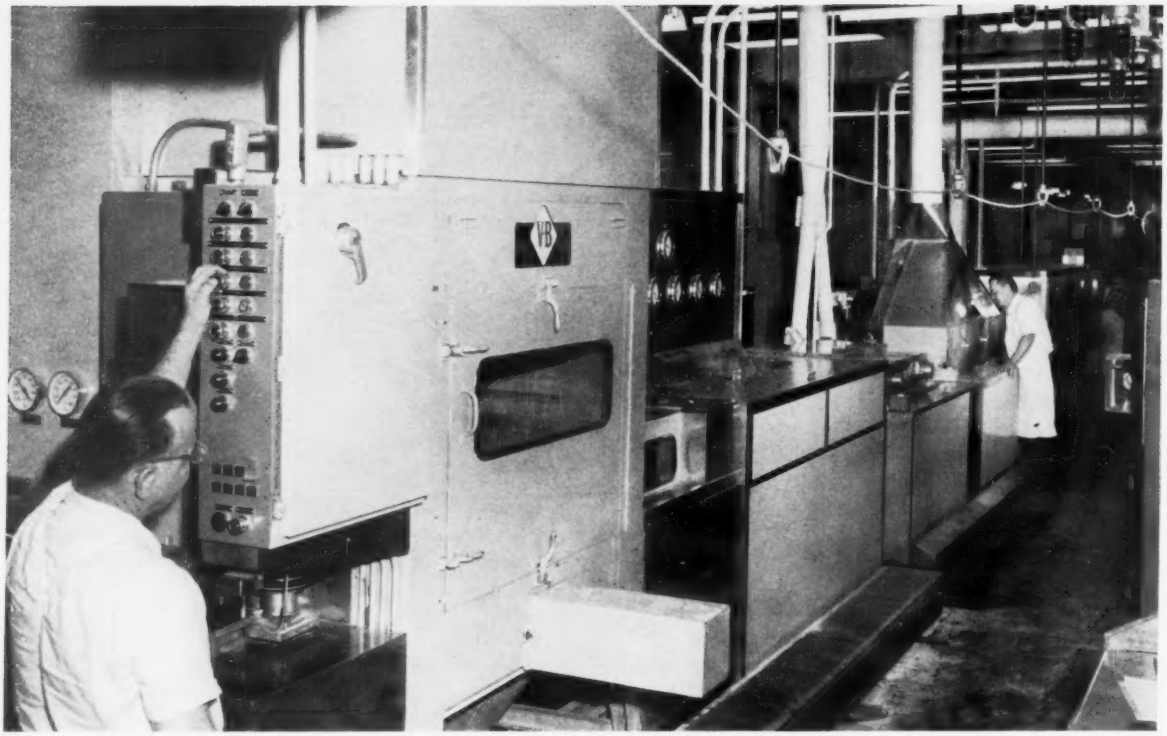
• The facility provides a rapid, inexpensive way to produce intricate parts for missile and space vehicles.

When unusually large, deep parts with intricate contours must be drawn in ultrahigh strength metals, big, expensive presses or other forming devices are needed. Alternate techniques like spinning, hand forming, or joining smaller pieces produce parts that often aren't as accurate as designers would like.

Explosive forming provides accuracies within a few thousandths of an inch with relatively inexpensive tooling. A variety of materials can be employed—concrete, plaster, or plastic dies are often adequate for a few parts. When conventional die steels are employed to make larger quantities of parts, only the female half of a die is required. Intricate embossings and surface finishes are reproduced.

When the blanks are in place on a die, the cavity or mold is usually evacuated to prevent heating.

Astronautics explains that its present space programs include three radiation test satellites for the Advanced Research Projects Agency and "man in space" studies for the Air Force and the National Aeronautics & Space Administration.



1. IBM's high speed soldering line: Parts pass through a vapor blast station, wash and dry station, flux station, solder station, and a defluxing station

Soldering Line May Pay For Itself in Seven Months

• SPEED and reliability are combined in an automatic soldering line designed and installed by IBM at its General Products Div. plant, Endicott, N. Y. It handles the vapor blasting, fluxing, wave soldering, and ultrasonic defluxing of circuit cards at a rate of more than 100 a minute. What's more, the unit is expected to pay for itself in seven months.

Key features include batch loading and unloading of boards and timed spacing of each board from station to station. The setup replaces a semiautomatic line which had fewer controls and produced 48 cards a minute.

Process controls monitor each important station. If a process fails to operate properly, the line shuts down automatically. Interlocks prevent pileups by shutting down the entire line. Switching arrangements permit partial operation of the line.

• Twenty boards (each one has eight cards) are loaded in a hopper.

A metering device deposits boards automatically on a pair of transport rails. A synchronized transport cylinder moves the board forward until it is picked up by the vapor blast conveyor belts. A timer (in the control console) generates the pulses that operate the metering and transport cylinders. Pulse frequency is variable and regulates the input speed of boards to the process line.

• Dirt, oil, and oxides are removed by a vapor blast (air pressure driving abrasive and water slurry).

Air pressure to the six blast guns is controlled by solenoid operated valves. When the valves are open, they supply air to the guns for atomizing the slurry. The guns are mounted in an oscillating frame that reciprocates across the line of board travel. Following vapor blast, the board moves through an air screen chamber where positive air pressure prevents the rinse chamber water from entering and diluting the abrasive slurry. It also cuts the amount of slurry carried on by the board. In the rinse chamber, the board is flooded with fresh water from fixed nozzles above and below the path of travel.

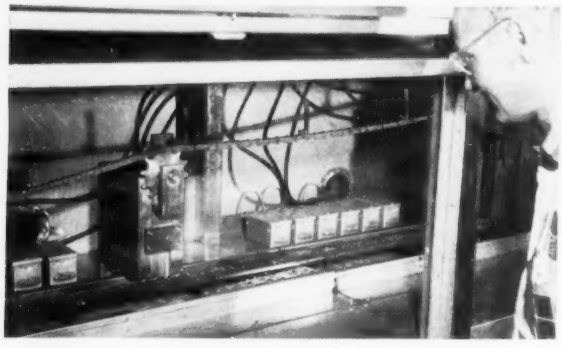
• Photoelectric cells at the head and tail of the vapor blast-rinse area keep count of the boards. If the count is not maintained, an automatic system stops the process and sounds an alarm.

The next station, a drying oven, removes water from the boards with hot, dry air at 290 cfm. Six tubes, each with eight or nine air jets, are set above the boards and six are below the boards.

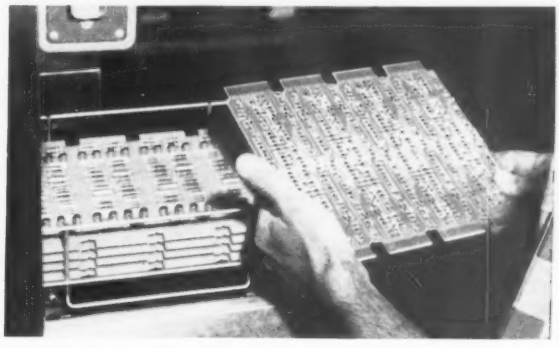
• A delay point between the drying oven and the fluxing stations

2. Circuit boards (eight cards each) are loaded into the hopper that feeds them into the line

3. At the soldering station, a wave of solder brushes the underside of the boards (13,000 joints per minute)



4. Boards are moved through ultrasonic defluxing tanks



5. Completed, the boards are given a quick visual check

permits manual loading or unloading for partial line operation. It also provides a good point for in-process inspection.

At the end of the oven, two, flat belt conveyors position the boards in the delay point hopper. The hopper, which holds several boards, is over the loading section of the flux station. Boards are conveyed to the fluxing station by a conveyor system of two rotating shafts with helical screws on their outside diameter. The helix on each shaft fits into a notch in the board, carrying it along as the shaft turns.

• As a board reaches the inside of the flux station, it trips a limit switch and turns on a gun which sprays flux to the circuit side of each board.

An exhaust fan prevents atomized flux from leaking out of the station. Because of the flammable flux carrier, an automatic, CO_2 extinguishing system is installed to go off when a thermostat senses 165° F. Fluxed boards enter the solder station and are preheated by a radiant glass panel to reduce thermal shock from hot solder. Preheat also increases flux activity.

• As the board travels across the solder pot, it strikes only the top of the solder wave.

IBM says the wave technique reduces the thermal load on the board and also increases the exposure of the metal surfaces on the board that must be covered. Solder wave height is produced by a pump inside the solder pot. Other soldering equipment includes a cast iron pot with a stainless steel liner, heating elements, and solder level indicators.

To cut downtime, the soldering equipment is dolly mounted to permit easy replacement for maintenance or repair.

After passing through the solder station, the board is ejected by an arm and finger that moves the board along a pair of guide rails to be picked up by the defluxing conveyor. If the defluxing line is shut down, the hinged rails can be swung down to allow the boards to go into a tank of deflux solution immediately below the rails.

The defluxing conveyor (a chain that moves atop the boards) has fingers spaced at 1 ft intervals to push the boards along guide rails through the defluxing station. Chain motion is intermittent to extend immersion of the boards in the deflux baths. The boards pass progressively through three tanks (mounted end to end). The tanks are long enough to completely immerse three boards in each with every fourth board halfway between tanks.

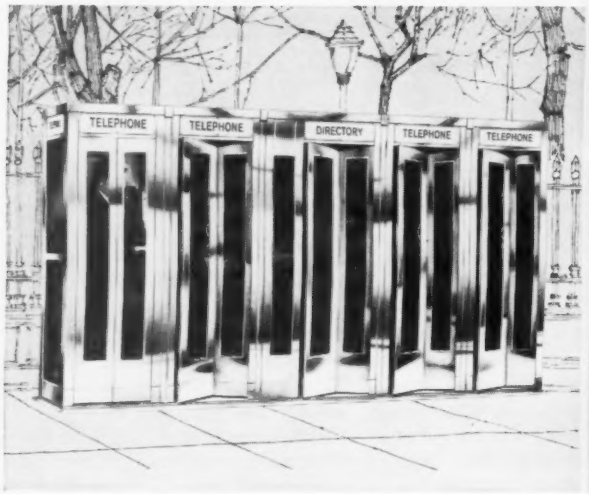
Defluxing is done by a Chlorothene solvent agitated by six, ultrasonic transducers in the base of the tanks. Solvent fumes are exhausted to a disposal area. Because of the solvent's high evaporation rate, drying is relatively simple, says IBM. Eight air jets are positioned (four above and four below the board path) at the trailing end of a draining section.

After the chain conveyor finger moves the board past the drying area, the finger rises and leaves the board at the stacker. A cylinder moves the board into a stacker unit where a lifting platform raises the board to a standard container. A counter records the number of boards fed into the container.

Give your products a competitive edge with

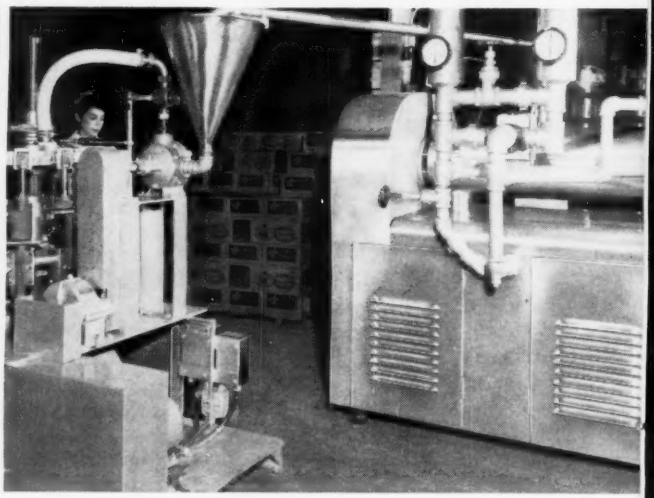
A new door sill will last a lifetime because it is Stainless Steel protected. A tank car is light, strong, easy to clean because it is Stainless. A storage vessel can keep liquid gases for long times without leaking or without contamination because it is made of Stainless Steel. Every day, Stainless is specified for demanding applications like these, because designers, manufacturers and their customers *know* that they can count on Stainless Steel's dependability every time.

Anyone who uses Stainless Steel gives his product added value. It has superior corrosion resistance to harsh reagents. Stainless Steel has great strength, so products can be made lighter in weight; there's no need to "over-design." It is attractive. Stainless Steel keeps its gleam. It doesn't fade or pit or take



Weather won't dull these Stainless Steel telephone booths

When you consider the abuse a phone booth has to take—rain, hot sun, corrosive atmospheres, vandalism and heavy traffic—it's easy to see why booths should be made of Stainless Steel. A Stainless Steel booth can stand up to all this punishment and still stay bright and new-looking for years. That's because Stainless Steel resists corrosion so well, is so strong, and can be *welded* into a tight, solid unit. These booths were manufactured by the Sherron Metallic Corporation, Brooklyn, New York.



Stainless Steel equipment makes peanut butter creamier

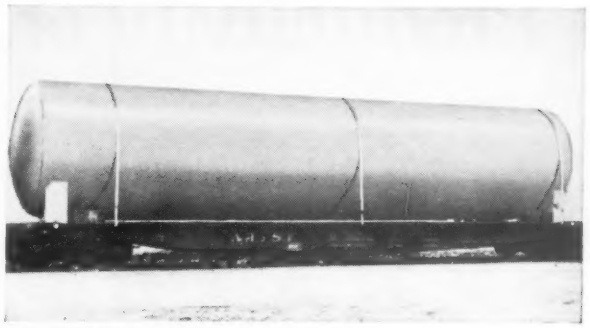
If creamy peanut butter is your dish, chances are it was processed in Stainless Steel equipment. This system takes whole roasted peanut meats in one end, grinds them, then the Votator equipment, manufactured by the Girdler Process Equipment Division, Chemetron Corporation, Louisville, Kentucky, cools the butter and turns out the finished product, ready for sandwich or cracker. Stainless Steel is used here in the heads and shaft of the heat transfer area to assure maximum cleanliness. The unit is sealed, so Stainless Steel's inherent corrosion resistance is insurance against expensive breakdowns.

Stainless Steel

For Stainless Steel, call your nearest Steel Service Center.

USS Stainless Steel

on a dulling film. And it is in the market that Stainless Steel shows its competitive edge of quality against most other materials. Go first class; specify Stainless Steel. You should consider Stainless Steel on the basis of quality and performance. We welcome the opportunity to work with you in finding new markets and new uses for Stainless Steel. Write U.S. Steel, 525 William Penn Place, Pittsburgh 30, Pa.

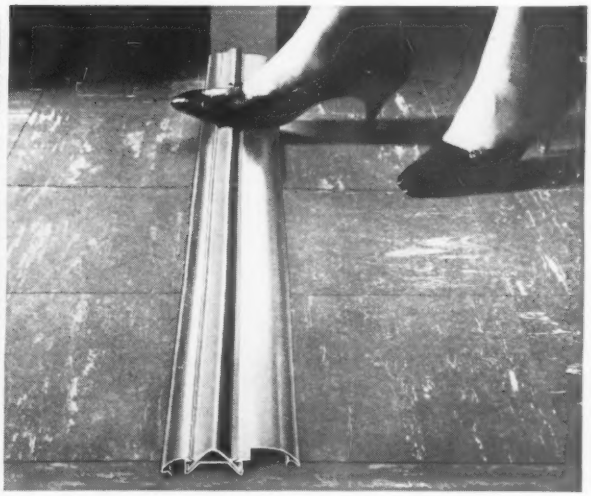


This is a Stainless Steel Lox box

The Lox Equipment Company, Livermore, California, specializes in building vessels that store and carry liquid oxygen. They use Type 304 Stainless because they know they can depend on Stainless to keep its toughness even at very low temperatures. Stainless stays clean, too—vitally important in applications like this. Lox also builds cryogenic vessels for the Air Force's Titan missile program—with Stainless Steel of course.

Stainless Steel keeps a kitchen good-cooking

Inspect the kitchen of any really fine restaurant and it's a good bet it will be Stainless Steel. Stainless Steel is invaluable anywhere food is prepared because it is easy to keep clean. It doesn't harbor odors or tastes, it resists corrosion, and it is so strong and long-lasting that replacement costs are insignificant. The finest home kitchens use lots of Stainless Steel for the same reasons, plus the fact that its gleaming appearance makes any kitchen a pleasant place to work. This Stainless Steel cooking equipment is by Vulcan-Hart Corporation, Louisville, Kentucky.



Stainless protected threshold costs no more

This new threshold by United Industries, Inc., Chicago, Illinois, will take the toughest kind of punishment and still keep a just-new appearance because it is Stainless Steel protected. There are no cracks or joints to catch dirt and it is 100% self-sealing to keep out drafts, heat, rain, snow and insects. It is quickly and easily installed and sells at no extra cost—another example of the added value Stainless Steel gives to a product.

USS United States Steel

TRADEMARK

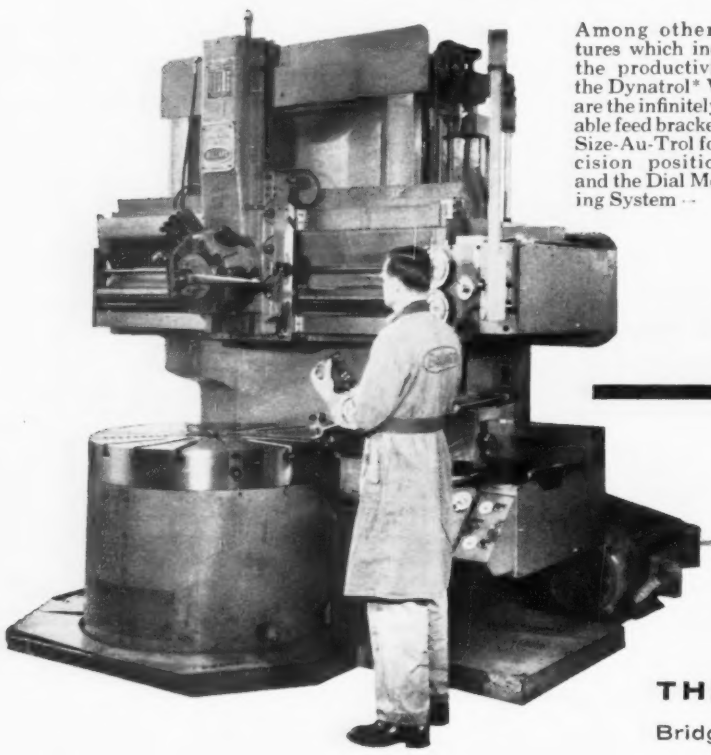
FINGER-TIP CONTROL

Increases Productivity of...

BULLARD

DYNATROL*
VERTICAL TURRET LATHES

Directional control of all head motions in feed on traverse, either horizontally, vertically or at any 45° angle, as well as table start and stop from a lightweight portable pendant, is a distinct production advantage.



Among other features which increase the productivity of the Dynatrol* V.T.L. are the infinitely variable feed bracket with Size-Au-Trol for precision positioning, and the Dial Measuring System --

It allows the operator to always be in the most advantageous position in relation to the work and eliminates the necessity of climbing for buttons or levers. By reducing operator fatigue and increasing his efficiency, more metal is removed per hour with a lower cost per piece.

*TRADE MARK

ask your Bullard Sales Engineer for the complete Dynatrol story or write for catalog.

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Bridgeport 9, Conn., Telephone EDison 6-2511

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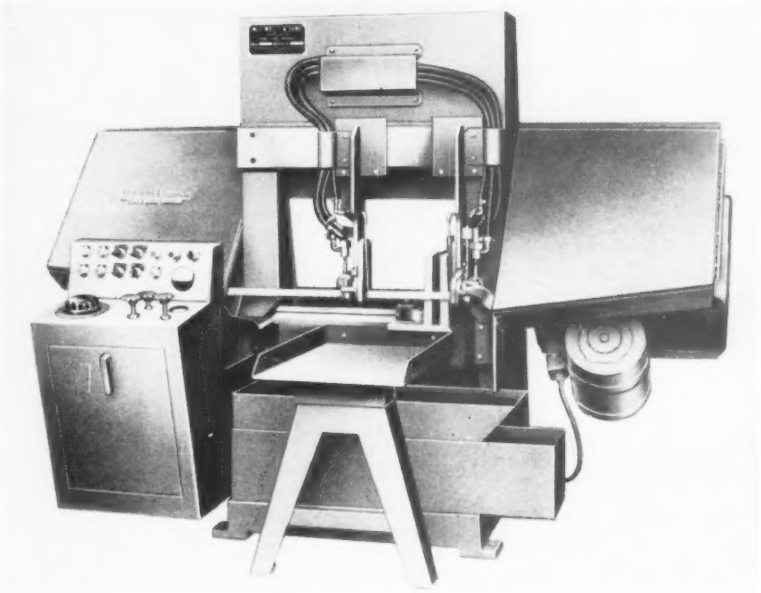
Horizontal Bandsaws Designed for Heavy Duty

TWO horizontal bandsaws are designed for heavy duty metal cutting with high speed or carbon steel blades. Model Q-14 has a 14 x 18 in. cutting capacity. Model QJ-24 has a 24 x 24 in. rating. Both are hydraulic and automatic. They have twin columns with the cutting head raising and lowering vertically for horizontal blade action.

The units have a self-contained variable speed drive which operates with conventional, friction type, speed changes. The operator dials the desired speed from 40 to 400 fpm. Controls are mounted on a stationary panel. Both machines are powered by 5 hp blade motors. The company's BF-24 automatic power feed is optional.

For further information, *write* W. F. Wells & Sons Inc., Three Rivers, Mich.



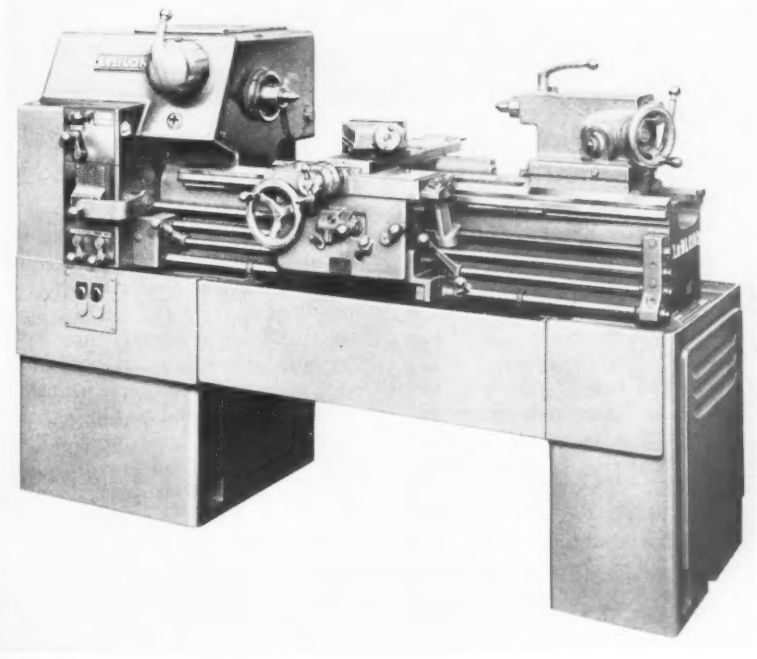
Lathe Holds Strict Toolroom Tolerances

STURDILY BUILT to hold strict toolroom tolerances, this 5 hp lathe has these features: Apron reverse to leadscrew, single lever selection of 16 speeds from 31 to 2400 rpm, and a built-in horsepower meter.

The dual drive headstock provides 12, gear driven, spindle speeds for positive power in the lower ranges and four, belt driven speeds for smooth power in the high range. The three bearing spindle contains zero precision, Timken bearings. Automatic force feed lubrication is provided. An electric clutch and brake provide smooth and positive stops and starts.

A totally enclosed, quick change box provides 48 feed and thread changes. A safety interlock prevents engagement of coarse feeds while in the high speed range. A dial at the end of the spindle provides convenient indexing for chasing multiple threads.

LeBlond's thrustlock tailstock



puts the handwheel at a convenient angle and provides full length support to the spindle. A dial measures spindle travel. Clamping is quick acting.

Reverse to the leadscrew and feed is controlled from the rigid, one piece apron. A single lever engages both cross and length feed through a positive jaw clutch. A single trip for feeding and chasing in each direction (spindle forward only) is standard. Quickset dials are provided for both cross feed and compound rest.

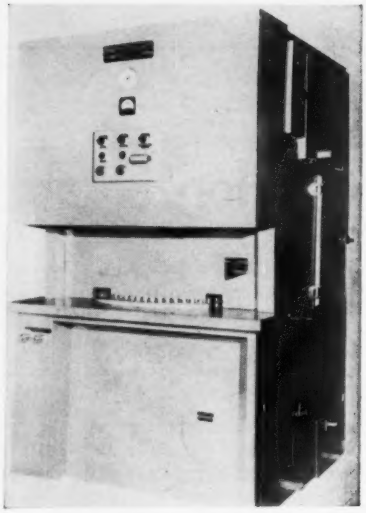
For further information, *write* R. K. LeBlond Machine Tool Co., Cincinnati 8, Ohio.

Automaticity Stressed In Wet Blast Finisher

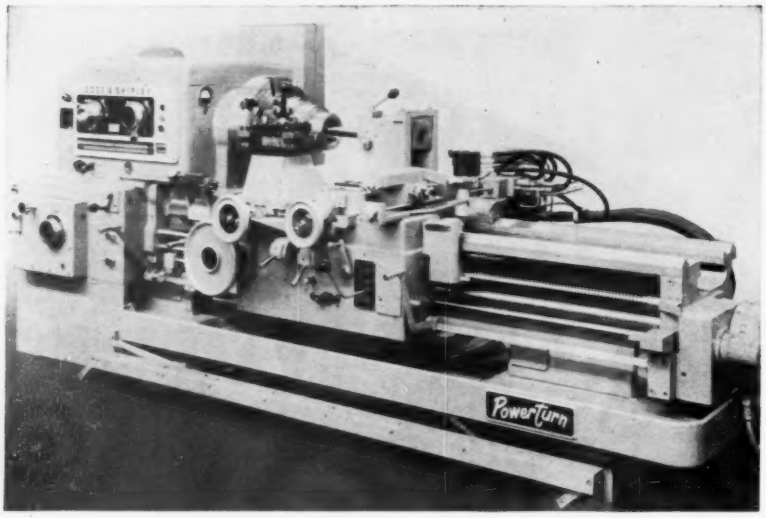
FACILITIES for workpiece movement, special tooling, and post-wet-blast operations such as rinsing and drying are incorporated in an automatic, wet blast unit devedoped by Pressure Blast.

The Rotomatic machine is easily adapted to a wide variety of wet blast finishing applications where high speed, automatic output is required. The unit is 50 in. wide, 50 in. deep, and 75 in. high. Except for areas which are skirted for decorative or safety purposes, stainless steel is used for fabrication.

The five internal compartments or sections can be fitted with a combination of blast guns, rinsing, or drying facilities required for the operation. Design of the rotary table enables indexing or constant motion operation and the simple mounting of special rotating work fixtures.



For further information, *write* Pressure Blast Mfg. Co. Inc., 27 Pleasant St., Manchester, Conn.



Lathe Contour Bores, Turns, Faces

THIS LATHE has been designed for accurate contour boring in conjunction with ordinary facing and turning operations. It performs a dual function by means of dual tool slides on a single carriage.

One slide has a four way tool block for turning and facing and the other slide is tracer controlled with a vertically pivoting, boring bar holder. The swingup boring bar holder on the separate slide permits full indexing of the four way tool block down to the center line of the machine without interference from the boring bar while retaining positive location of the bar.

The unit is equipped with a modulated feed, hydraulic tracer to assure a constant feed rate over all contoured surfaces and uniform surface finish. The manufacturer says the lathe offers unusual versatility on a wide variety of parts requiring precision boring and turning operations and turret lathe work where only one station on the turret is needed. Horsepower ratings up to 30 can be provided. Other specifications and dimensions are comparable to the 2516 engine lathe.

For further information, *write* Lodge & Shipley Co., 3055 Colerain Ave., Cincinnati 25, Ohio.

Fill and Wipe Machine Finishes Dials, Emblems

A FILL and wipe machine for automatic finishing of dials, emblems, and other parts has been developed by Conforming Matrix. The unit fills first or second surface depressions (with dial filler), wipes them, and then proceeds with polishing.

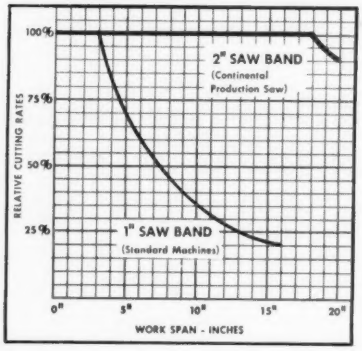
The setup has a rotary index table with eight spindles which spin in five stations and are available for loading and unloading in three stations. The table can be

USES NEW 2-in. WIDE TUNGSTEN CARBIDE and Demon® HSS SAW BANDS

a DoALL PRODUCTIVITY-PLUS product

new Continental Production Saw changes economics of cutoff sawing

... outperforms any other band saw on a cost-per-cut basis on work up to 16" x 20" section



Two in. wide blade and machine design provides constant cutting rate to the capacity of the machine. The above chart shows the greater cutting rate of the 2" saw band over the 1" saw band.

Pays off on small work which can be ganged because cutting rate and accuracy are maintained as for a single piece.

The development of 2-in. wide saw bands simultaneously with the new Continental Production Saw has completely revolutionized the economics of cutoff sawing. The 2-in. saw bands have four times the beam strength of 1-in. band.

The resulting increase in band rigidity to permit heavy feeds provides cutting rates up to 30 sq. in. per min. in mild steel. *New* accuracy standards also result from this 2-in. blade and machine combination.

Machine Features

- Overhead vises provide unobstructed work area
- Automatic chip disposal
- Hydromechanical drive (no belts)
- Fast automatic index with micrometer adjustments (to 3½" stub ends)
- Automatic feed control for most efficient cutting rate in varying work sections
- Recirculating coolant system

You can see the Continental Production Saw work in a sound color movie right in your office—or better yet, see it demonstrated in the DoALL Hall of Progress in Des Plaines. Call DoALL today.

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Price $1475 Model DH-612 6" x 12" 12 types Rent $9.46 per week

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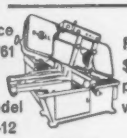

Price $2761 Model C-12 6 types Rent $17.70 per week

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18 types All sizes

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SHOP BLOCKS* 84 pcs. Price $265

18" x 24" Price $80 All sizes, grades

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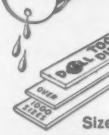

2,000 Sizes • grades

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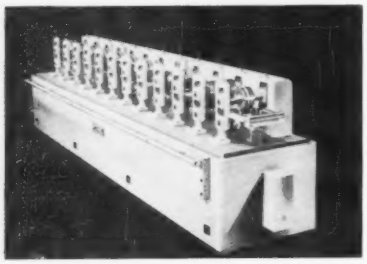
equipped to accommodate any combination (up to five) of interchangeable accessory heads, including a fill head, a smear wipe, a full wipe, a light buff, and a painting head.

For further information, *write* Conforming Matrix Corp., 777 New York Ave., Toledo 11, Ohio.

Form Rolling Machines Produce Variety of Shapes

FORM rolling machines (Series 40, 50, and 60) have been introduced by Met-L-Rol Corp.

Series 40 machines are intended primarily for roll forming of small shapes from light gage metals (such as metal awning parts, weather stripping, glazing bead, trim molding).



Series 50 are suitable for roll forming the wider, flat shapes, and structural members of moderate size.

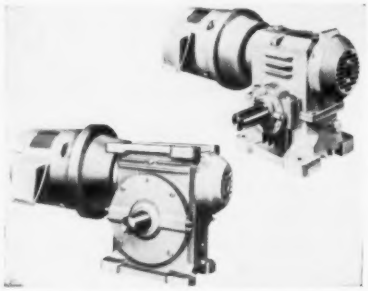
Series 60 units can accommodate the deeper shapes such as are used in carports, roof panels, and deeper structural components.

For further information, *write* Met-L-Rol Corp., P. O. Box 1417, Hialeah, Fla.

Right Angle Gearmotors Cooled by Radial Fans

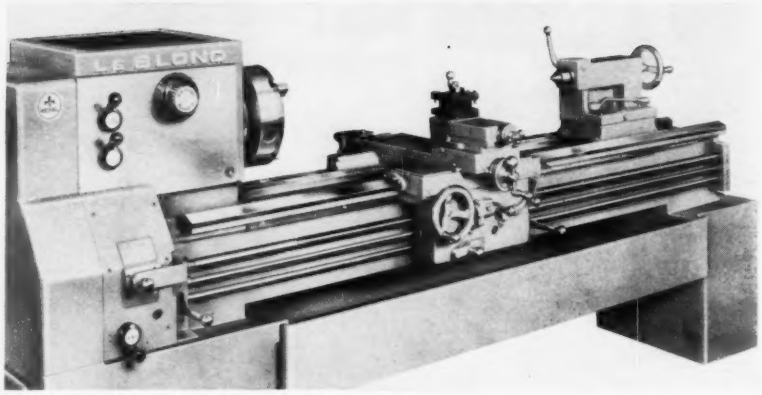
AVAILABLE with single reduction worm gearing, a line of right angle gearmotors is suitable for use with apparatus driven by belts, couplings, chains, or spur gearing.

Alternating current motors are in NEMA frame sizes 182 (1 hp) to 286U (20 hp), direct current motors in sizes 187A (1 hp) to 286A



(15 hp). High thermal efficiency is gained by an aluminum radial fan that cools the finned sides of the gear housing. Life-Line A and Life-Line H motors are integrated with the gearmotors. They are round frame types with NEMA D standard flanges.

For further information, *write* Westinghouse Electric Corp., P. O. Box 2099, Pittsburgh 30, Pa.



Hydraulic Shift Easily Added to Lathe

HYDRAULIC shift can be ordered as original equipment on LeBlond Regal lathes or you can specify the standard manual shift.

It can be easily and inexpensively converted to hydraulic shift at any time.

A Servo-Shift package which fits inside the standard headstock makes easy conversion possible. Included in the package are a shift control unit which fits under the headstock cap (hand levers are removed and replaced by a dial), a crawl speed gear train which mounts on a built-in bracket at the end of the headstock, a hydraulic motor-pump which mounts on the opposite side of the same bracket, and a small relay chassis which fits among the standard electricals. The lathes are available in 13, 15, 17, and 19 in. capacities. The 17 and 19 in. styles can also be furnished as plain bed gap lathes with a special carriage and removable block having about 50 per cent increased swing through the gap. Sliding bed gap sizes (17/28 in. and 19/28 in.) provide a means of increasing bed length as well as swing by 50 per cent.

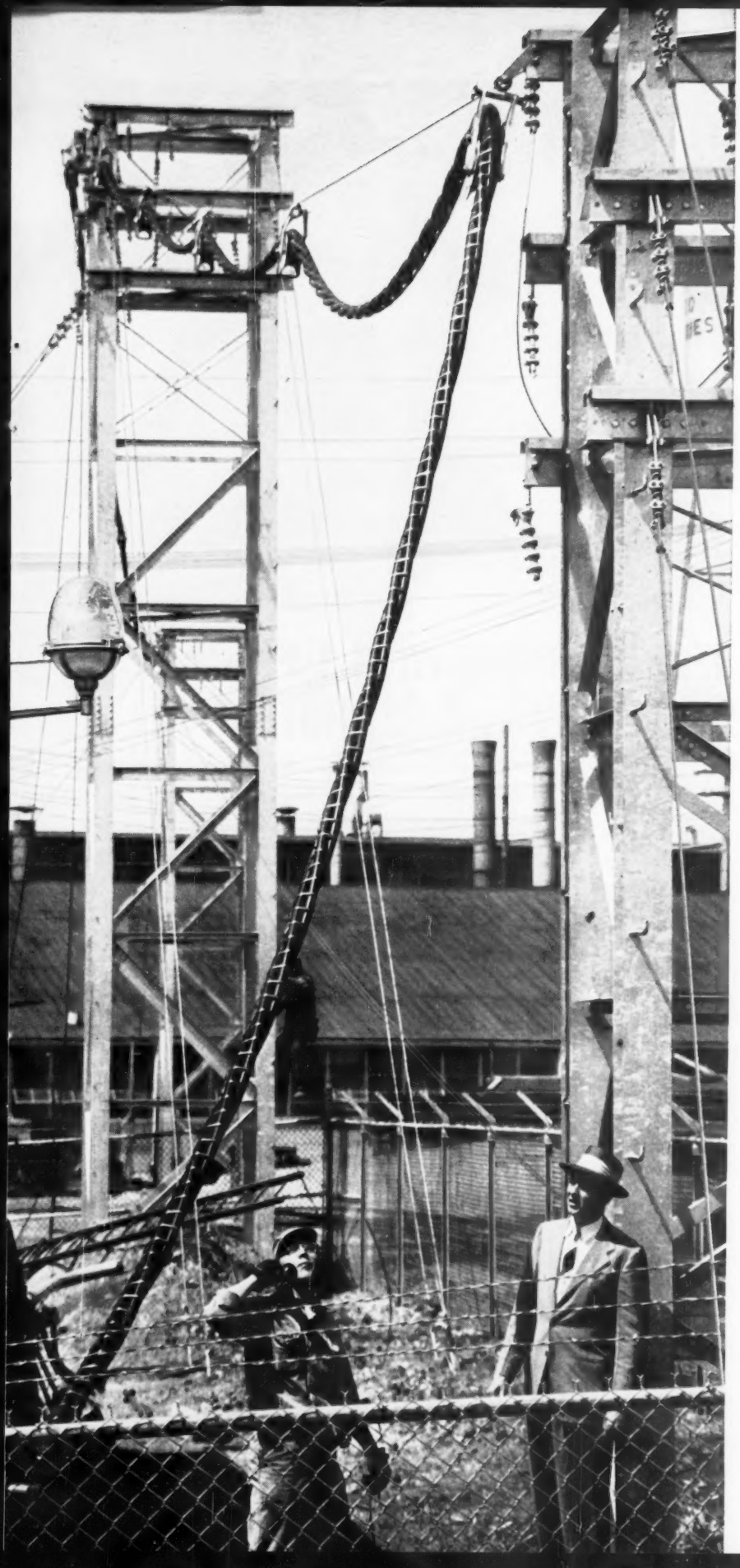
For further information, *write* R. K. LeBlond Machine Tool Co., Cincinnati.

Refractory Container Has Hopper Bottom Dispenser

A SELF-dispensing, hopper bottom container has been developed for refractory ramming and gunning mixes made by Kaiser.

The container, Kaiser-Pak, was designed by the Kaiser organization in conjunction with the Corrugated Container Co. (Columbus, Ohio) to provide customers with an easy, low cost method of handling refractory materials required to reline, resurface, or repair open hearth or electric furnaces.

The triple walled, corrugated box is mounted (on wooden pallets) for handling by a fork lift truck. Inside the outer carton are two inner containers (each with a capacity of 1000



GO UP TO BRING COSTS DOWN WITH ANACONDA AERIAL CABLE

Anaconda's compact, self-supporting factory pre-assembled aerial cable is installed as a *single unit*. No field assembly is required—and no lashing operation. In plants where the maze of pipes and other underground structures often make installation of ducts or buried cable costly or difficult, this cable solves the problem.

It's fast, easy to install—particularly in crowded areas. You need only one assembly even for three-phase circuits. No special ducts, crossarms, or insulators are required.

You can attach Anaconda aerial cable directly to a pole or building-attached bracket.

Type AB butyl insulation and Neoprene jacket affords resistance to moisture and heat. For the full story, call the Man from Anaconda today. Or write: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York; Department EFL-1-S. 61262

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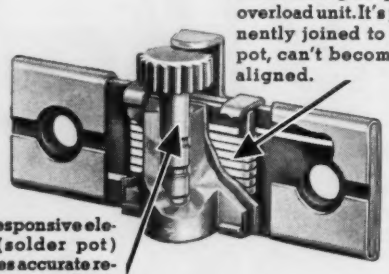
FOR SELF-SUPPORTING AERIAL CABLE

ONLY SQUARE D STARTERS WITH 1-PIECE OVERLOAD RELAYS GIVE *Absolute* PROTECTION!

• Only Square D makes thermal overload relays with 1-piece construction—and only with 1-piece construction can you *know* you've installed the heater correctly. Square D 1-piece overload relays can be installed only one way. They are factory-assembled, individually tested and calibrated, completely tamper-proof. Repeated tripping will not affect accuracy.

You *pay* for overload protection—be sure you *get* it. Insist on Square D 1-piece overload relays for *absolute* protection.



Heat-producing element is an integral part of overload unit. It's permanently joined to solder pot, can't become misaligned.

Heat-responsive element (solder pot) provides accurate response to overload, yet prevents nuisance tripping.

D EXCLUSIVE— 1-piece Overload Relay for *ABSOLUTE* Protection!

Mail coupon today for simple "jig-saw" demonstrator—see why only Square D gives absolute protection

Square D Company
Department SA-215
4041 North Richards Street
Milwaukee 12, Wisconsin

Please send me information on Square D magnetic starters, along with your simple 3-minute "jig-saw" demonstrator

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE____ STATE_____

SQUARE D COMPANY

wherever electricity is distributed and controlled

lb). They can be dumped separately or simultaneously.

For further information, *write* Kaiser Refractories Div., Kaiser Aluminum & Chemical Corp., Kaiser Center, 300 Lakeside Dr., Oakland 12, Calif.

Vibrating Feeder Handles Tiny Parts, Fine Powders

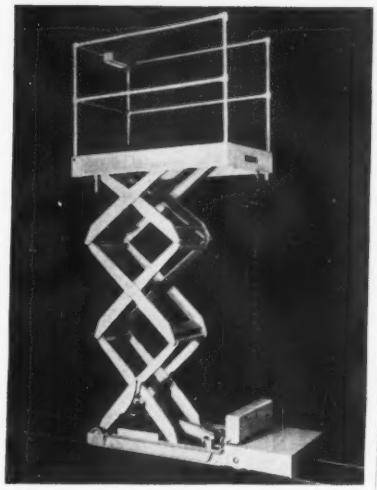
A VIBRATING feeder for tiny parts down to fine powders is 3 in. in diameter and 2⅜ in. high. The maker says it can be built right into work stations.

The light colored, plastic bowl is noncontaminating and may be machined for any feed or escapement application. External magnetic effects are absent.

For further information, *write* Minimus Co., 1582 Manning Ave., Los Angeles 24, Calif.

Lift Has 8 ft Reach

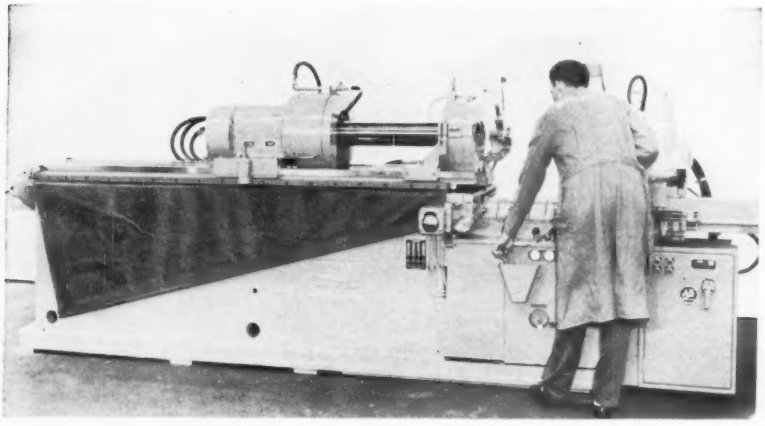
THIS self-contained personnel lift has an extended height of 8 ft, bringing racks 14 ft high well within the reach of an operator. A push-button console on the handrail controls ascent, descent, and lateral travel.



The manufacturer says the operator can work both sides of the aisle with equal ease, speed, and safety.

Specifications: 750 lb capacity, 24 x 50 in. minimum platform, 48 x 72 in. maximum platform, 16 in. collapsed platform height, 75 in. over-all length, and 134 in. over-all height.

For further information, *write* Southworth Machine Co., 30 Warren Ave., Portland, Maine.



Internal Grinder Handles 9 in. Holes

THIS EXTRA long, Bryant 1416, internal grinder (4 ft longer than the standard model) was designed to grind the bores and faces in precision machine tool spindles and similar parts.

The part illustrated is reversed

(*Please turn to Page* 160)

Capacability means

Dependability

When it comes to furnace maintenance refractories, *dependability* is Basic. You won't need the "Alpine Rescue Squad" if you rely on Basic's dead-burned dolomites, MAGNEFER and SYNDOLAG. For more than 40 years steelmakers have known these products as the standard of comparison for heat-to-heat furnace repair.

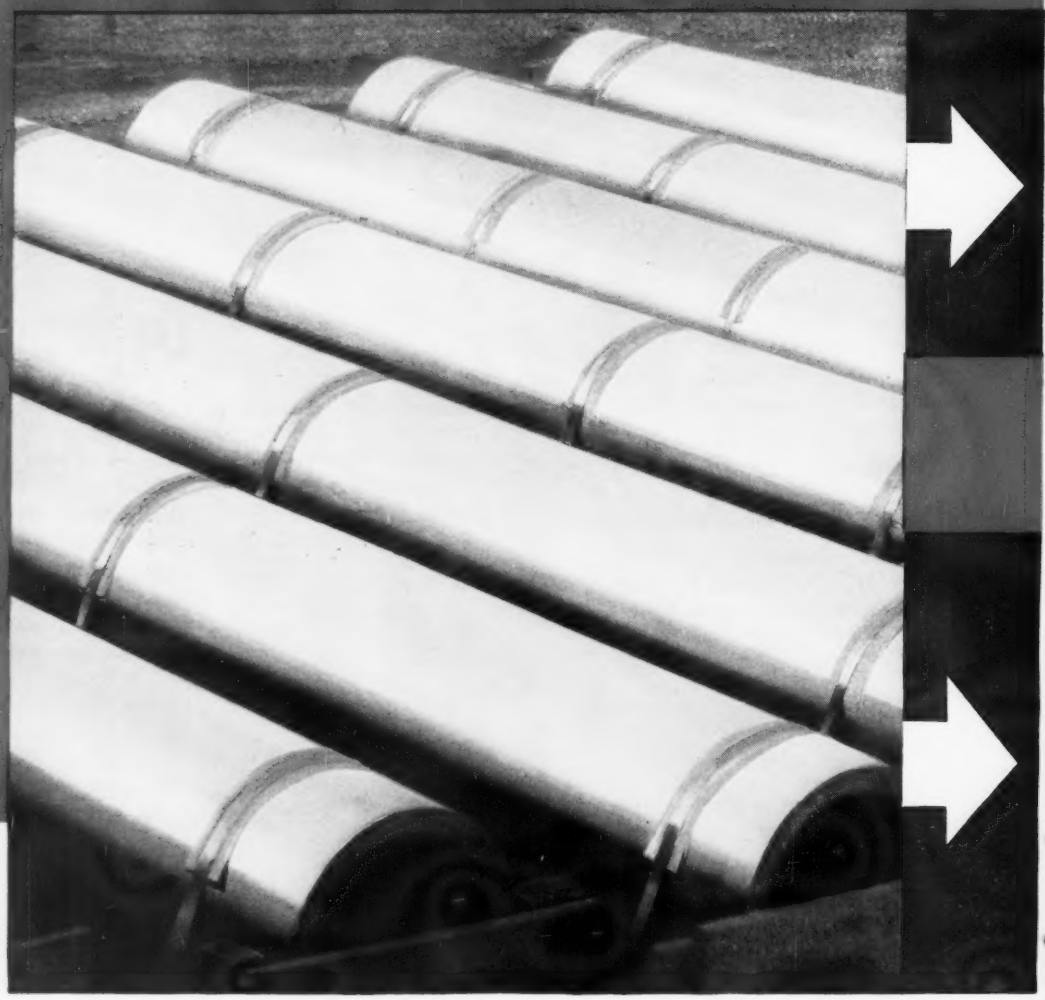
MAGNEFER and SYNDOLAG provide better bonding, greater density and higher heat resistance. Used in virtually every open hearth and electric steelmaking shop in the country, MAGNEFER and SYNDOLAG give you more advantages, more for each of your refractory dollars.

If you use basic refractories, you can depend on Basic's *capacity* and *ability*. Write for 24-page booklet outlining application of Basic's more than thirty dead-burned dolomites, ramming and gunning refractories, patching materials and tar-bonded linings for basic oxygen furnaces.

BASIC INCORPORATED
845 HANNA BUILDING
CLEVELAND 15, OHIO

new nuclear plants choose

FULFILLS THE EXACTING HEAT EXCHANGERS



Centrifugal stainless steel castings readied for shipment by U.S. Pipe

The Government's new SPERT III nuclear plant at the National Reactor Station near Idaho Falls, Idaho, operating since December, 1958 to study nuclear reactor safety, uses U.S. Pipe's centrifugally cast stainless steel pipe for its coolant system.

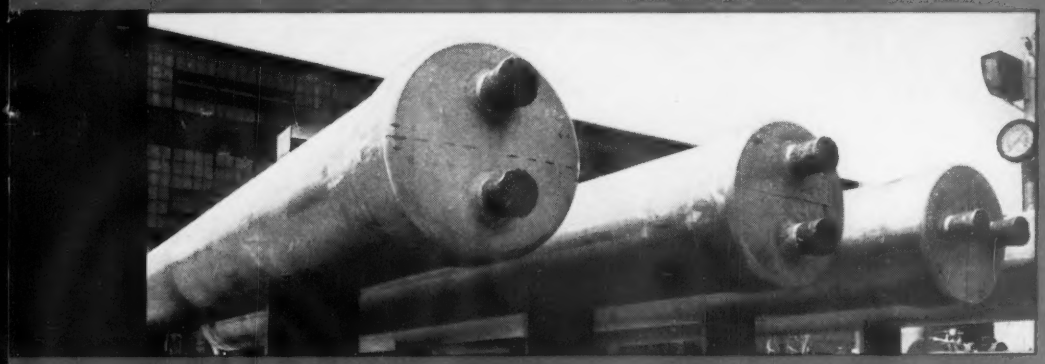
SPERT III is classified as a high pressure, high temperature, light water moderated and cooled reactor. Its versatility permits transient tests under various initial conditions of pressure, temperature, and coolant flow. For example, pressures ranging from atmospheric to 2,500 psi and water temperatures from 68° to 668° F.

Another new nuclear power plant, engineered and constructed by Stone & Webster for Yankee Atomic Electric Company, is using centrifugally cast stainless steel heat exchanger shells made by U.S. Pipe and fabricated by the Southwestern Engineering Company in Los Angeles, Calif.

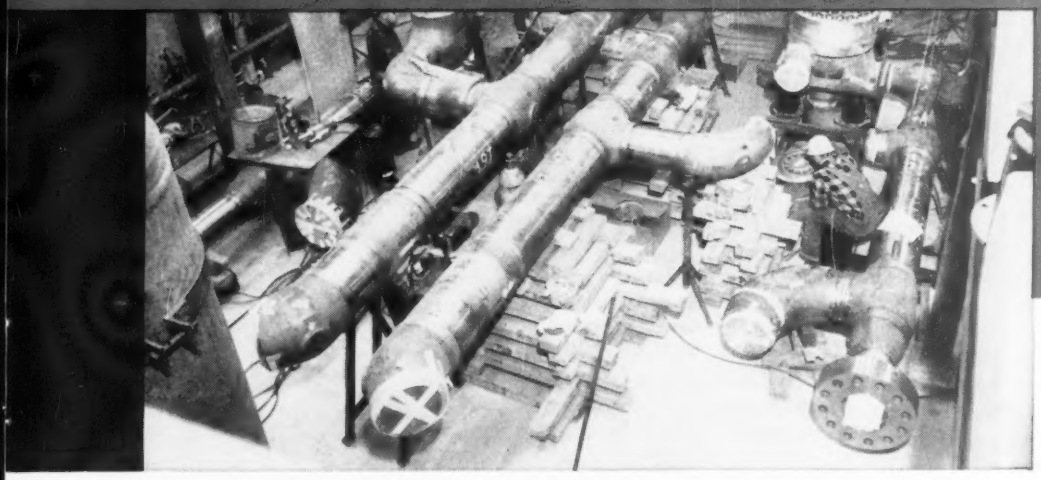
Stainless steel, centrifugally cast, made to rigid specifications, may be the answer to your piping or heat exchanger problem. For more information, write or call:

centrifugally cast stainless

REQUIREMENTS OF NUCLEAR AND COOLANT SYSTEMS



Shop-fabricated heat exchanger shells of centrifugally cast stainless steel ready for shipment to the Yankee Atomic Electric plant at Rowe, Mass.



Subassemblies of primary coolant piping of centrifugally cast stainless steel being installed in SPERT III.

ASA PRESSURE PIPING CODE STATUS

Approval has been granted under this code for the use of centrifugally cast austenitic pipe for nuclear piping by Nuclear Case N-9. This case appeared in the April, 1960 issue of MECHANICAL ENGINEERING. Reprints on request.

UNITED STATES PIPE & FOUNDRY CO.

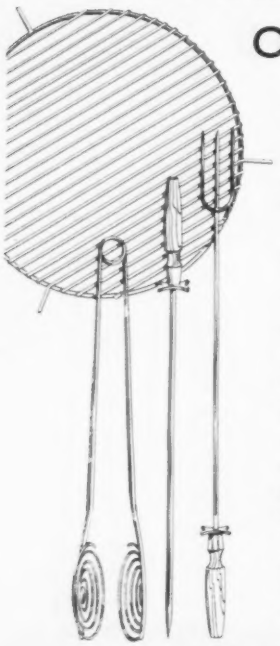
Steel and Tubes Division

STEEL & TUBES U.S. PIPE DIVISION

BURLINGTON, NEW JERSEY

SALES OFFICES: BURLINGTON, HARTFORD, BIRMINGHAM, CHICAGO, CLEVELAND, DALLAS, LOS ANGELES, NEW YORK, PITTSBURGH, SAN FRANCISCO

Example: FINER "TOOLS" FOR OUTDOOR LIVING



There are no finer grills, implements or "tools" for outdoor living than those made from Continental Wire. There's a temper, gage and finish for almost any product—with smooth clean surface for fast production, and quality to take the forming you require for your product.

Your product may be entirely different—hardware for venetian blinds, or ball bearings, or automotive parts. For a wide variety of applications you can get just the right wire at Continental, in the temper, size, and steel analysis you require.

For your wire requirements in low, medium low, medium high or high carbon steels, round or special shaped, in many different coatings, drop us a line. Our mill technicians have solved hundreds of wire problems, and will be happy to give you the benefit of their experience. Write for free copy of the Continental Wire Manual.

WIRE SPECIALISTS FOR OVER HALF A CENTURY

CONTINENTAL STEEL
CORPORATION · KOKOMO · INDIANA

PRODUCERS OF: Manufacturer's Wire in many sizes, tempers, and finishes, including Galvanized, KOKOTE®, BRYTITE®, FLAME SEALED®, Coppered, Tinned, Annealed, Liquor-Finished, Bright and special shaped wire. Also Welded Wire Reinforcing and Galvanized Fabric. Nails, Continental Chain Link Fence and other products.

NEW PRODUCTS and equipment

(*Concluded from Page* 157)

end for end between operations to permit grinding concentric bores in both ends. Specifications require that holes 8 in. deep in each be held within 0.0002 in. for size, straight within 0.0001 in., and round within 0.000040 in.

Parts are driven by a six jaw chuck at the workhead end of the machine and supported at the front by a steadyrest. Rest and head are positioned on two parallel ground ways. A third aids gage mounting at setup and end for end reversing of work. It swings parts up to 16 in. in diameter and grinds holes up to 9 in. in depth. Tapers up to 30 degrees included angle can be ground.

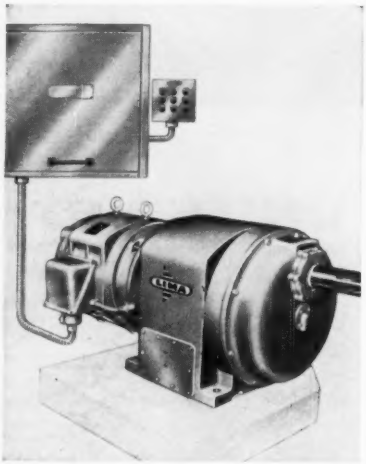
For further information, *write* Bryant Chucking Grinder Co., Springfield, Vt.

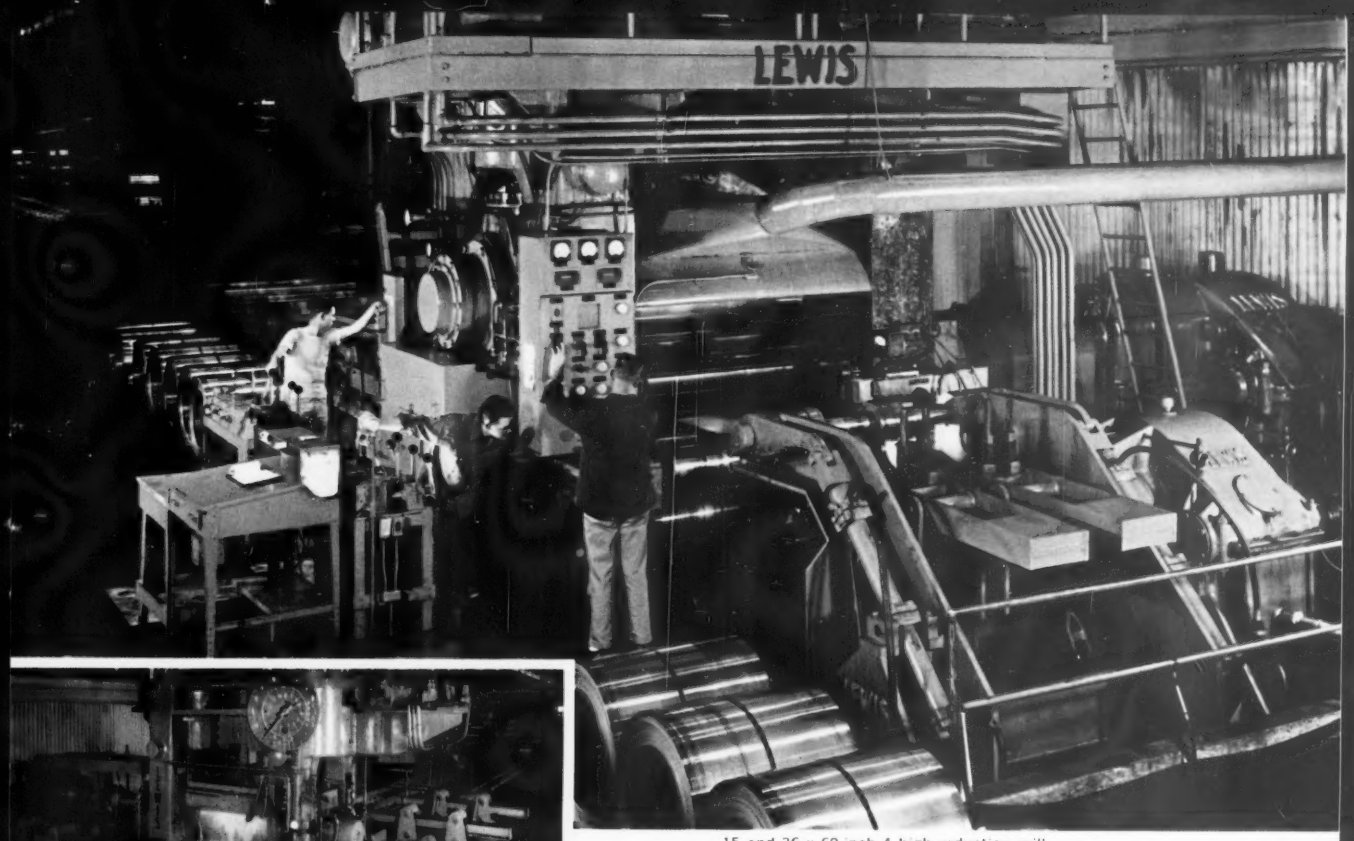
Six Speed Drive Delivers Full Power in Each Range

THE SIX speed, Selectro-Shift drives introduced by Lima are intended for equipment where large horsepowers are needed and multiple speeds are required. Full rated horsepower is delivered at the output shaft in every speed. Ratings: 20, 25, 30, and 40 hp.

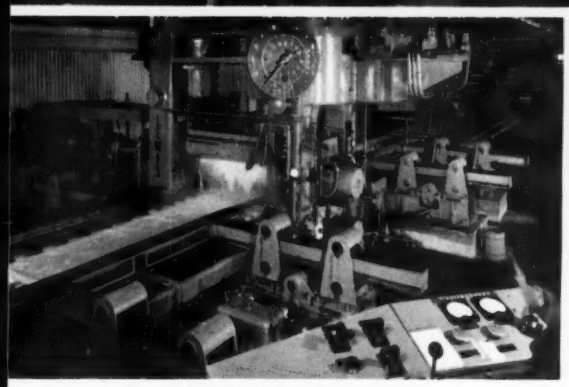
Hydraulic clutches activated by electric solenoids shift the drive to any of the six speeds while running under full load. Shifting is controlled (remotely, if desired) by an

(*Please turn to Page* 165)





15 and 36 x 69-inch 4 high reduction mill.



30 x 70-inch 2 high hot reversing mill.

BLAW-KNOX ALUMINUM REDUCTION MILLS

Blaw-Knox designs and builds a full range of mills for the reduction of aluminum and other non-ferrous metals. Other Blaw-Knox equipment for the metals industry includes: Complete rolling mill installations and auxiliary equipment for ferrous and non-ferrous metals: • Sheet and strip processing equipment • Electrolytic tinning, annealing and galvanizing lines • Seamless pipe and tube mills • Draw benches, and cold draw equipment • Blaw-Knox Medart cold finishing equipment • Iron, alloy iron and steel rolls • Carbon and alloy steel castings • Fabricated steel plate or cast-weld design weldments • Steel plant equipment • Heat and corrosion resisting alloy castings. Blaw-Knox Company, Foundry and Mill Machinery Division, Blaw-Knox Building, Pittsburgh 22, Penna.

BLAW-KNOX

Blaw-Knox designs and manufactures for America's growth industries: METALS: Rolling Mills • Steel Processing Lines • Rolls • Castings • Open Hearth Specialties • PROCESSING: Process Design, Engineering and Plant Construction Services • Process Equipment and Pressure Piping • CONSTRUCTION: Concrete and Bituminous Paving Machines • Concrete Batching Plants and Forms • Gratings • AEROSPACE: Fixed and Steerable Antennas • Radio Telescopes • Towers and Special Structures • POWER: Power Plant Specialties and Valves

"Ever see pliability like that? It's Acco's New Hi-Pli Wire Rope Sling! And it straightens out when released!"

- *It's pliable as hemp with the strength of steel*
- *It's practically kink-proof*
- *Hi-Pli lasts longer...use again and again*
- *Makes fast, easy work of any lift*

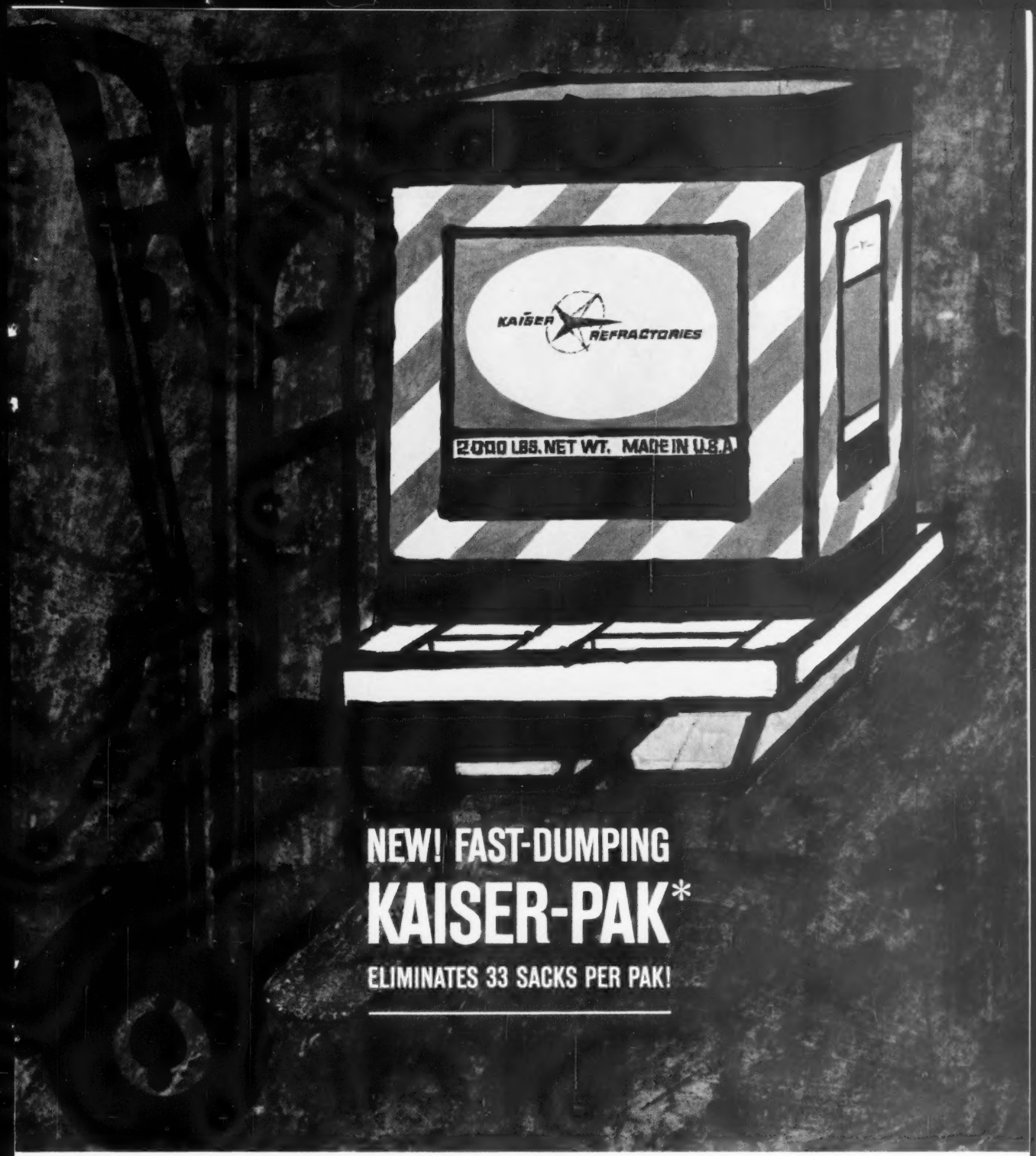
They're called "Hi-Pli" for high pliability, the result of ACCO's own arrangement of six ropes around one. They have patented Dualoc endings that double lock the sling ends. They have a durable, clean Galacco finish that resists rust. And, of course, Hi-Pli slings are registered safe...your assurance they have been factory proof-tested at twice rated capacity. The tag and certificate tells you this.

Ask your distributor about Hi-Pli...or write us at Wilkes-Barre, Pennsylvania, for **Bulletin DH-532B.**

HI-PLI ACCO Registered® SLINGS

Wire Rope Sling Department • American Chain & Cable Company, Inc.

Wilkes-Barre, Pa., Atlanta, Chicago (Melrose Park), Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, Portland, Ore., San Francisco, Bridgeport, Conn. • *In Canada:* Dominion Chain Company, Ltd., Niagara Falls, Ont.



NEW! FAST-DUMPING KAISER-PAK*

ELIMINATES 33 SACKS PER PAK!

...delivers one ton of Kaiser ramming mix or gunning grains as fast as you can pull two tabs! Kaiser-Pak is Kaiser Refractories' new palletized, moisture-proof carton. Pull one rip tab at its bottom—and a half-ton of material pours neatly between the forks of your lift. Pull the other and you've dumped a measured ton. Time: about one minute.

Each Kaiser-Pak eliminates lifting, ripping, dumping 33 sixty-pound or 20 hundred-pound sacks!

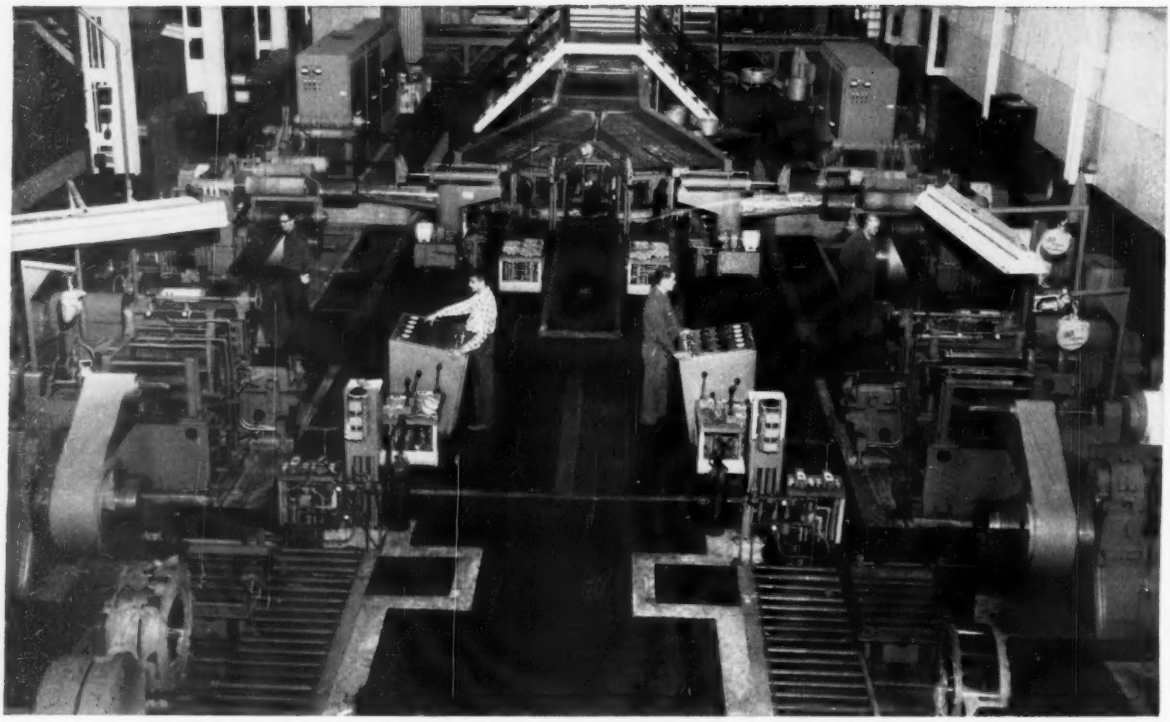
For more information about this new contribution to customer service, ask your Kaiser Refractories Sales Engineer—or write Kaiser Refractories:

OAKLAND 12, CALIF. . . . . 300 LAKESIDE DRIVE
MEXICO, MISSOURI . . . . . MEX-R-CO BUILDING
PITTSBURGH 22, PA. . . . . 3 GATEWAY CENTER

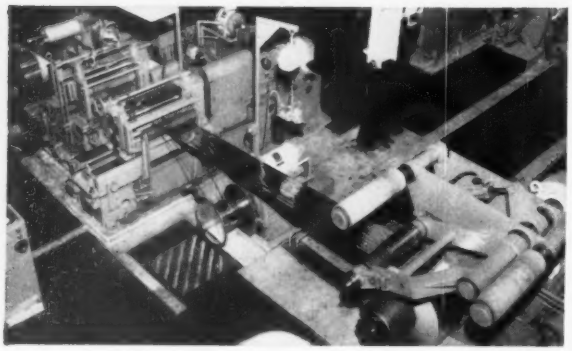
(Canadian Subsidiary: Refractories Engineering & Supplies, Ltd.)

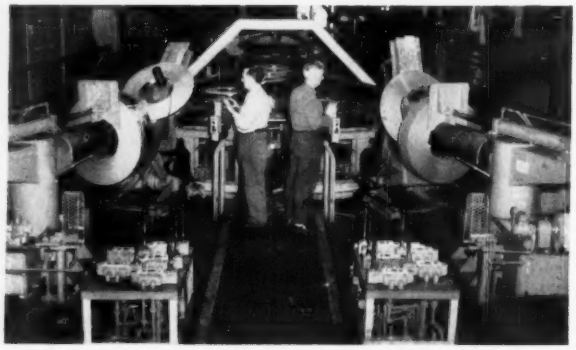
KAISER REFRACTORIES

*T. M. KAISER ALUMINUM & CHEMICAL CORPORATION



Predictable Performance...





SECO Slitting Installation, Superior Steel Division, Copperweld Steel Company, Carnegie, Pa.

is automatic—start to finish—with a SECO *Slitting Line*

SECO STEEL MILL EQUIPMENT

- Leveling and Shearing Lines
- Combination Edging and Flattening Lines
- Tension Reels for Strip Polishers
- Narrow Strip Grinding Machines
- Slitting Lines
- Multiple Strand Pull-out Rolls and Take-up Frames
- Strip Coilers (Up and Down Type)
- Traverse Reels for Narrow Strip
- Steel Coil Up-enders
- Scrap Ballers

Affiliated with Lee Wilson Engineering Co., Inc.

SECO

Every operation in this *complete* slitting line by SECO—from entry to exit of coils—is fully automated. It was specifically designed and built by SECO to meet the maximum performance requirements of the Superior Steel Division, Copperweld Steel Company, Carnegie, Pennsylvania.

SECO's staff of experienced sales engineers, specialists in production problem solving, are prepared to show you how you can get "predictable performance" in *your* operation—whatever your requirements. Call or write today. West Coast representative: United Machine Tool Company, Los Angeles, California.

STEEL EQUIPMENT COMPANY

P. O. BOX 737, WARRENSVILLE STATION • CLEVELAND 22, OHIO

NEW PRODUCTS and equipment

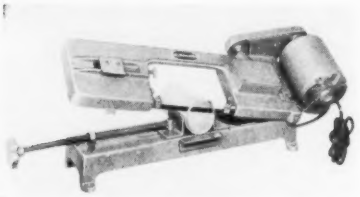
(*Concluded from Page* 160)
electric pushbutton station. The unit can be operated in reverse or forward position in all six speeds.

For further information, *write* Lima Electric Motor Co. Inc., a subsidiary of Consolidated Diesel Electric Corp., Lima, Ohio.

Portable Bandsaw Has High Degree of Accuracy

A PORTABLE, horizontal bandsaw for metal cutting jobs is said to have cutting accuracies comparable to capabilities of stationary equipment.

Called the Little G, the tool weighs 42 lb, including a ¼ hp motor. The tool uses a standard 59 x 0.5 x 0.020 in. blade with accuracies within 0.005 in. on a 3 in. cut. Rectangular capacity is 3½ x 6 in., diameters to 3½ in., and angle cuts to 45 degrees on sizes up to 3½ x 3 in.



For further information, *write* Griscer Industries Inc., Garrett, Ind.

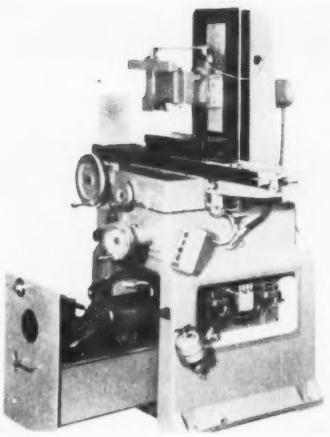
Hydraulic Surface Grinder Is Easy to Maintain

A HYDRAULIC surface grinder, Model 618-HYD, is equipped with a low pressure, hydraulic, power pack with electric valve controls and double pump.

The hydraulic package is in a handy pullout drawer to simplify maintenance. A double pump provides separate hydraulic circuits for table and cross slide motions. The hydraulic setup is designed to prevent air pockets from forming in the lines.

The operator can switch from power to hand feed and back instantly with a flick of a lever.

Operation and maintenance are simplified by such things as a special dust cleanout port; a sight gage hydraulic tank; and a two speed, rapid traverse, cross slide for fast wheel dressing. Table speed is variable to 125 fpm and cross feed is variable to 0.250 in.

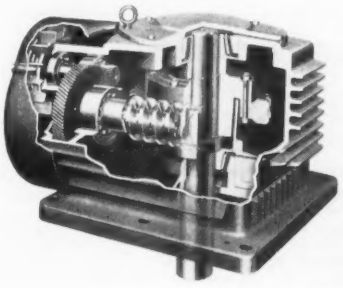


For further information, *write* Reid Bros. Co. Inc., Beverly, Mass.

Up or Down Shaft Available On Worm Gear Reducers

EFFICIENCY of high ratio worm gear reductions in the HUF and HDF speed reducers has been increased by a helical and worm gear, double reduction combination. The helical and worm gearing runs in a large capacity, common oil bath for effective cooling and lubrication. HDF models, downward output shaft types, have dry wells to avoid oil leakage. Units are available with shafts extending upward.

The helical gears are hobbed, crown shaved, and flame hardened to withstand the same momentary overload (300 per cent of rated load) as the worm gearing. Cooling fans (aluminum or plastic) are mounted on the high speed pinion to help insure adequate cooling of



Capacability means

Convenience

When it comes to ramming refractories, *convenience* is Basic. And, it pays to let Basic's magnesia ramming refractories, RAMSET and RAMICLASE, be your "ace in the hole" when schedules are tight. For quick, dependable bottom installations, they can't be beat.

In the 20 years since their introduction, RAMSET and RAMICLASE have become the standard of comparison for open hearth and electric furnace bottoms. For the best possible job, Basic furnishes special mixers, conveyors, rammers and other equipment to speed installation and reduce labor costs.

If you use basic refractories, you can depend on Basic's *capacity* and *ability*. Write for 24-page booklet outlining application of Basic's more than thirty dead-burned dolomites, ramming and gunning refractories, patching materials and tar-bonded linings for basic oxygen furnaces.

BASIC INCORPORATED

845 HANNA BUILDING
CLEVELAND 15, OHIO

In Every Important Industrial Center...

There's a

WYCKOFF

SALES and SERVICE REPRESENTATIVE

READY TO SERVE
YOUR COLD FINISHED STEEL BAR REQUIREMENTS

Call him... he will be glad to work with you!

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ALBUQUERQUE, N.M.
Paul R. Spencer Co., Inc.—Phone: 243-6875

AMERICUS, GA.
T. G. Walker—Phone: 3579

BOSTON, MASS.
R. B. Butler
Phone: (Putnam, Conn.) Walnut 8-2754

BUFFALO, N. Y.
J. E. Allen—Phone: NF 3-6400

CEDAR RAPIDS, IOWA
A. W. Eastin—Phone: Empire 5-2388

CHICAGO, ILL.
E. C. Rock—Phone: Bishop 7-6700

CLEVELAND, OHIO
C. B. Thoburn—Phone: Main 1-8662

DAYTON, OHIO
R. P. Cornell—Phone: BA 3-6571

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Paul R. Spencer Co., Inc.
Phone: Keystone 4-3293

DETROIT, MICH.
E. C. Koester—Phone: Trinity 2-2002

FARGO, N. D.
E. H. Thompson—Phone: 2-6493

FORT WORTH, TEXAS
C. A. Fischer—Phone: Edison 2-6402 or 2-5435

GREENSBORO, N. C.
K. O. Brown & Co.—Phone: Broadway 3-5973

HARTFORD, CONN.
Lane Johnston
Phone: (Putnam, Conn.) Walnut 8-2754

HOUSTON, TEXAS
Harry W. Renick, Jr.—Phone: Jackson 4-8294

KANSAS CITY, MO.
Fred H. Hoener—Phone: Endicott 2-2630

LOS ANGELES, CALIF.
Fred H. Currie, Inc.—Phone: DU 5-7448

MEMPHIS, TENN.
Al Rathheim and Associates
Phone: MU 2-2331

MILWAUKEE, WIS.
H. L. Schultz—Phone: Broadway 6-4441

MINNEAPOLIS, MINN.
Sandberg-Peterson Co.—Phone: West 9-6745

NEWARK, N. J.
W. A. Thompson—Phone: Bigelow 8-2277

PHILADELPHIA, PA.
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General Office—Phone: Atlantic 1-2750

PUTNAM, CONN.
N. A. Robinson—Phone: Walnut 8-2754

ST. LOUIS, MO.
E. R. Hensel Co.—Phone: Townsend 5-1900

SALT LAKE CITY, UTAH
Paul R. Spencer Co., Inc.
Phone: Ingersoll 6-3406

SAN FRANCISCO, CALIF.
Thos. S. Hutton & Son
Phone: Exbrook 2-7017

SEATTLE, WASH.
M. M. Mossman—Phone: Main 4-5393

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WYCKOFF STEEL COMPANY
GENERAL OFFICES:
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WORKS: AMBRIDGE, PA.—CHICAGO, ILL.
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Steel

WYCKOFF STEEL PRODUCTS • Carbon, Alloy and Leaded Steels • Turned and Polished Shafting • Turned and Ground Shafting • Large Squares • Wide Flats up to 12¾" x 2¼" and 14" x 1¼" • All types of Furnace Treated Steels including Carbon Corrected Steels

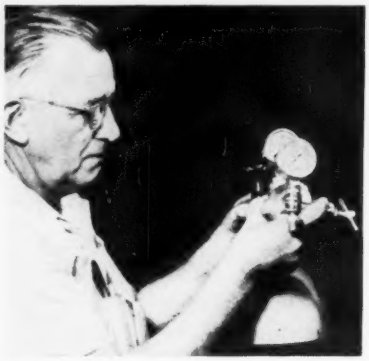
NEW PRODUCTS and equipment

the heavily finned cast iron housings. The company says the unit withstands high overhung loads.

For further information, *write* Cleveland Worm & Gear Div., Eaton Mfg. Co., 3300 E. 80th St., Cleveland 4, Ohio.

Single Stage Regulators Have Inverse Type Seats

INVERSE type seats are featured on a series of all purpose, single stage gas regulators for industrial use. The Airco 9100 Series for oxygen and acetylene provide slightly rising delivery or work pressure as cylinder pressure falls off. The manufacturer says that makes possible lower residual pressures at the cylinder and points than is attainable with a conventional, single stage regulator. Five models are available.



For further information, *write* Air Reduction Sales Co., a division of Air Reduction Co. Inc., 150 E. 42nd St., New York 17, N. Y.

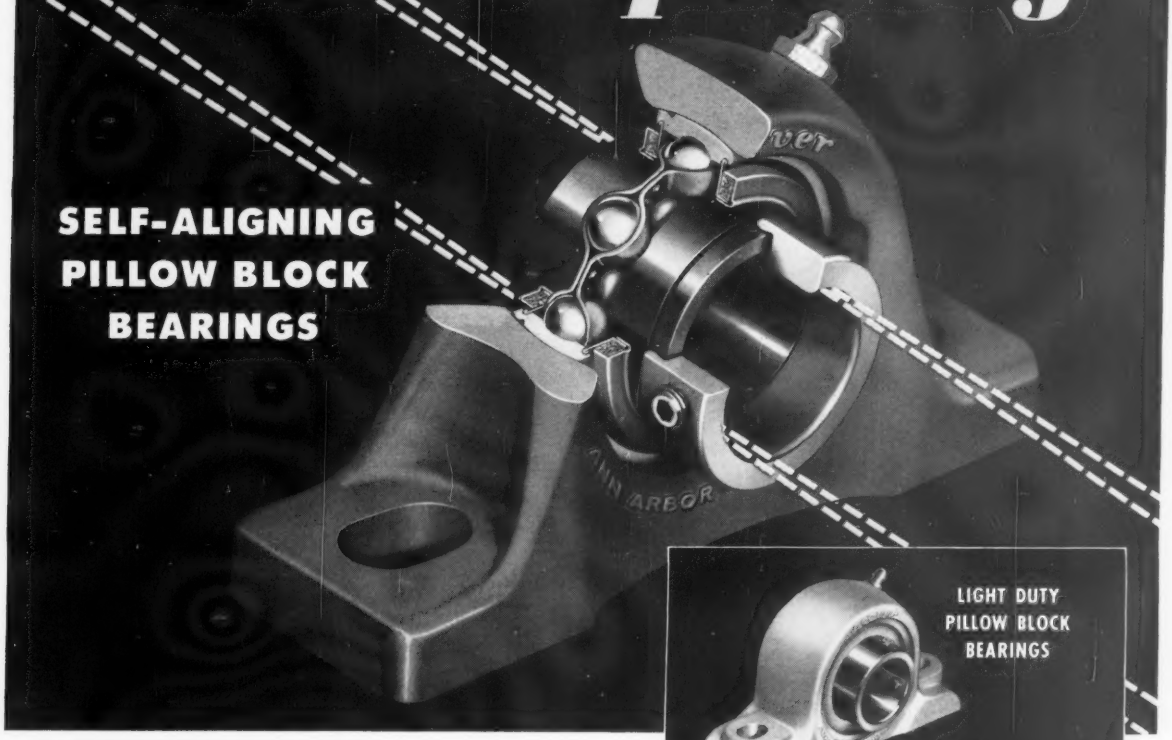
Machine Edge Conditions Narrow Strip Products

EDGES on steel strapping and similar narrow strip products are made burrfree with an edge conditioning unit developed by Seco.

Edge conditioning is done in two steps: Burrs are shaved from the strip as it passes through special rolls. A second set of rolls (vertical) rounds the corners of the stock. The unit is a pull-through type (not

hoover quality

SELF-ALIGNING PILLOW BLOCK BEARINGS



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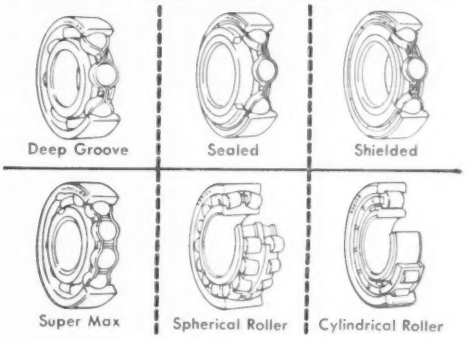

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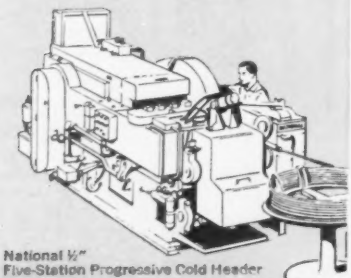

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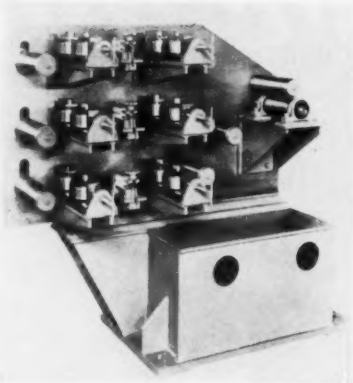

driven). It can be ordered separately for single or multiple strands or as part of a slitting line.

For further information, *write* Steel Equipment Co., affiliated with Lee Wilson Engineering Co. Inc., 20805 Aurora Rd., P. O. Box 737, Cleveland 22, Ohio.

Four Bar Trim Press Exerts 100 Tons Pressure

A FOUR BAR trim press developed by B & T Machinery Co. is equipped with an adjustable deceleration valve, making it capable of exerting 100 tons of trimming stroke pressure.

The hydraulic unit has an approach velocity of 900 ipm and a return speed of 875 ipm. The slow trimming action (59 ipm) produces neatly sheared, clean castings. Other features include a 36 x 72 in. die area, a supporting 52 x 88

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in. base platen, safety stops on the tiebars, and a 30 in. stroke.

For further information, *write* B & T Machinery Co., a division of Greenlee Bros. & Co., Holland, Mich.

Power Steering Standard On Fork Lift Truck

STANDARD power steering and full instrumentation are two of the no extra charge features of the 6000 lb capacity, fork lift truck developed by Baker.

It's powered by a six cylinder, Continental engine. These transmission options are offered: 1. Dry clutch, coupled with a Timken, two speed transmission. 2. Torque converter with the Baker Uno-Torque. 3. Torque converter with the Baker Duo-Torque.

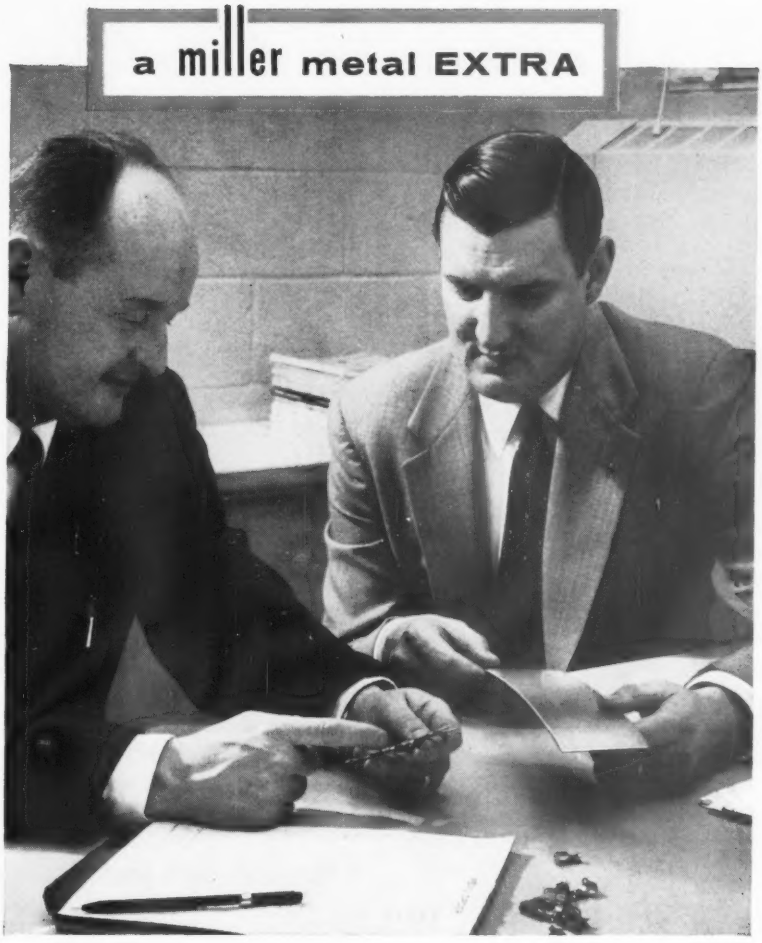
The unit (Model FGF-060) has a 104 in. turning radius, an over-all length of 108¼ in. (plus length of the load) and an over-all height of 87 in.

For further information, *write* Baker Industrial Trucks Div., Otis Elevator Co., 8000 Baker Ave., Cleveland 2, Ohio.

Overspray Collected on Spray Booth Curtain

AN AUTOMATIC, dry spray booth collects paint overspray on a disposable curtain. It has been named the Dispo booth. The curtain is mounted where filters are normally installed. Roller mounting permits the curtain to be rotated when the exposed area is saturated with paint particles.

The manufacturer says the design eliminates the need for pumps, pip-



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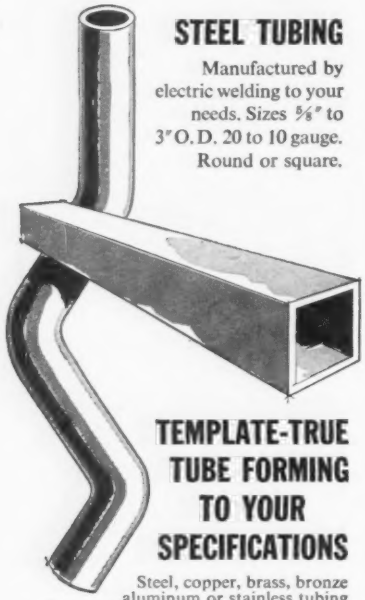

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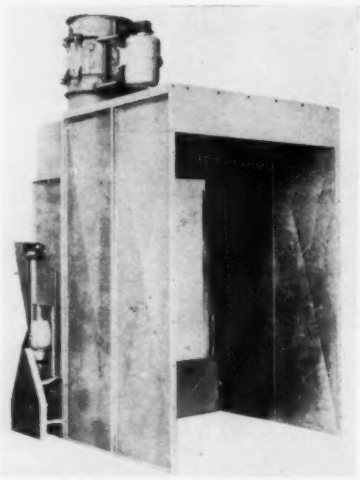
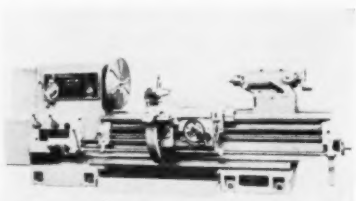


ing, water, water treatment, sewer connections, and booth and stack cleaning.

See it at Booth 138, National Metal Exposition, Cobo Hall, Detroit, or *write* Binks Mfg. Co., 3140 Carroll Ave., Chicago 20, Ill.

Swing Size Increased on Extension Bed Gap Lathe

SWING of the Nebel, heavy duty, extension bed, gap lathe has been increased in the gap to 49½ in. for added versatility. Designation of the model has been changed to HXB 2516/49. It has 18 gear driven speeds up to 1500 rpm. A heavy duty, quick change box provides 60 feeds from 0.0027 to 0.195 ipr, and 60 thread changes from 1 to 72 threads per inch including standard pipe threads. Up to 25 hp is supplied by a constant speed drive motor through a multiple disc, clutch, and brake.



The tailstock is equipped with two, direct reading dials for measuring tailstock traverse. One dial records in inches, the other in thousandths. They're resettable to zero

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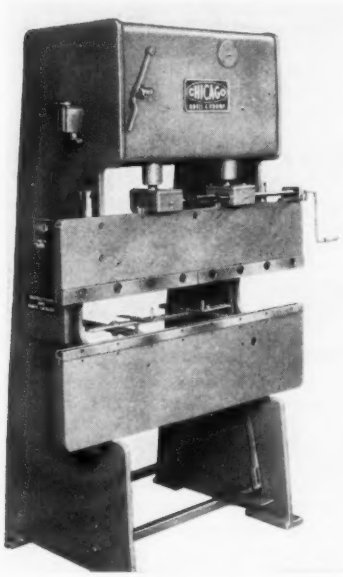
at any point to facilitate subsequent reading.

Optional is a two speed, tailstock traverse that provides a slower feed rate for drilling, reaming, or other tailstock operations (with the standard feed rate affording quick withdrawal). Speed selection is by plunger control on tailstock wheel.

Another option is a revolving tailstock with an antifriction, ball bearing quill. The quill can be locked for drilling or tapping. The manufacturer says the revolving tailstock provides built-in accuracy comparable to spindle precision. A special device compensates for heat generated in the workpiece during operation.

For further information, *write* Dept. 45, Nebel Machine Tool Corp., 103 S. Cooper Ave., Cincinnati 15, Ohio.

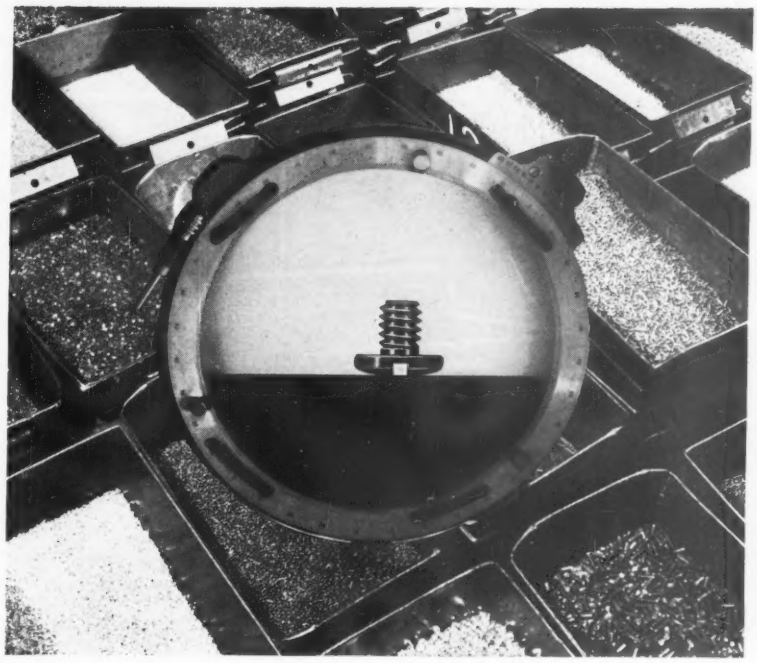
Press for Light Duty Has 2 in. Stroke



A SMALL, light duty press brake (Model 135) has been developed by Dreis & Krump. It has a 15 ton capacity for bending 30 in. of 12 gage to 48 in. of 16 gage mild steel.

Steel plates are welded to form a rigid frame. The press has a deep section bed and ram, infinitely variable speed drive and adjustable ram, and a stroke of 2 in.

For further information, *write* Dreis & Krump Mfg. Co., 7400 S. Loomis Blvd., Chicago 36, Ill.



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3. After slotting, blanks are inspected for quality of cut and depth and width of slot; also for dimensional accuracy. Fasteners are again tumbled to remove slotting burrs and chemically cleaned.
4. Thread rolling operation precision checked for accuracy and fasteners chemically cleaned.
5. Secondary operations checked for dimensional accuracy and workmanship. Again chemically cleaned.
6. Plating operations checked to insure compliance with required specifications.
7. Orders inspected for quality and cleanliness prior to shipment to be sure no foreign matter is included that might jam automatic feeds. Sturdy, weatherproof containers sealed for shipment.

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MICROBOND, a new product developed in the laboratories of Detrex Chemical Industries, Inc., is a micro-crystalline phosphate coating designed to greatly improve paint adhesion.

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MICROBOND provides controlled optimum coating weights which allow one coat paint systems to produce a high gloss paint finish. This finish has far superior direct and reverse impact properties over conventional pre-treated finishes. It will operate in regular five or more stage equipment.

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Spray Booth Compounds
Industrial Washers

NEW literature

Write directly to the company for a copy

Cellular Ceramics

A thin walled, cellular ceramic structure, Cercor, for varied high temperature uses is described in a brochure, NPC-2. New Products Div., Corning Glass Works, Corning, N. Y.

Damped Laminates

Damped laminates for the control of structural resonant response are described in an eight page bulletin (No. 719). It explains basic considerations in design and selection of protection systems to combat structural fatigue, component malfunction, and low reliability. Advertising Dept., Lord Mfg. Co., Erie, Pa.

Magnesium for Tooling

Fabricators and users of jigs and fixtures are given a quick review in a bulletin of advantages claimed for magnesium. Dow Metal Products Co., a division of Dow Chemical Co., Midland, Mich.

Brazing Alloys

A brazing alloy reference chart lists metal compositions, density, and melt and flow temperatures for Silvaloy, silver brazing alloys and Engaloy, precious metal brazing alloys. Technical Service Dept., Engelhard Industries Inc., 75 Austin St., Newark 2, N. J.

Boiler Feed Water

Feed water purity, the relationship of operating pressure to boiler water composition requirements, external and internal feed water treatment, and other similar topics are discussed in Bulletin 30 (24 pages). Nalco Chemical Co., 6216 W. 66th Place, Chicago 38, Ill.

Tubular Products

General characteristics of common stainless steel alloys used for tubing are shown in tables included in a 20 page bulletin (No. 13). Also presented: Information on nickel and nickel alloy tubing, glass to metal sealing alloys, and reactive and refractory metals in tubular form. J. Bishop & Co., Malvern, Pa.

Powder Metallurgy

Applications and case histories are presented in two issues of *Powder Metallurgy Quarterly* which discuss progress in that field. Metal Powder Industries Federation, 60 E. 42nd St., New York 17, N. Y.

Scrap Processing

Technical Bulletin No. 7, entitled *The Electric Furnace*, is the first in a series covering phases of steelmaking techniques involving scrap, with special attention to preparation and specifications from the scrapyard operator's viewpoint. National Federation of Independent Scrap Yard Dealers Inc., Suite 1607, 29 Broadway Ave., New York 6, N. Y.

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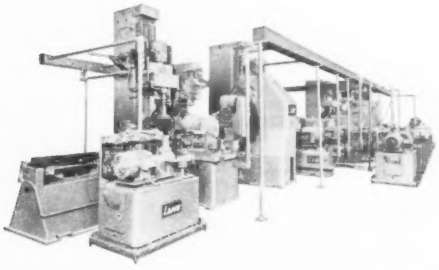
Be sure to investigate the benefits you get from putting Lamb experience and creative engineering to work on your manufacturing problems.

Hanging Gardens of Babylon

On the hot Mesopotamian plain, not far from the Tower of Babel, King Nebuchadnezzar (605 to 526 B.C.) built the sumptuous gardens to please his wife, Queen Semiramis, who longed for the mountains and fertile valleys of her native Assyria. Five terraces, each 50 feet above the other were covered with deep loam to support trees, plants and tame animals from the forest. An irrigation system drew water from the Euphrates to supply the fountains and feed the soil. After Babylon was taken by the Persians, the city sank into ruin and was covered by desert sands.

One of a series of paintings by Mario Larrinaga, commissioned by F. Jos. Lamb Co. Copies suitable for framing available on request.



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Hot Rolled Steel in Coil	Cold Rolled Steel in Coil	Plates (3/16" and lighter)
Hot Rolled Pickled Steel in Coil	(full hard only)	Electrical Sheets
Hot Rolled Sheets	Cold Rolled Sheets	Electric Weld Line Pipe
Hot Rolled Pickled Sheets	Alloy Sheets and Plates	Spiral Welded Pipe

Acme-Newport Steel COMPANY
NEWPORT, KENTUCKY
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Market Needs Automotive Push

LOOK for the steel market to resume its upward push after Ford Motor Co. and Chrysler Corp. sign new contracts with the United Auto Workers.

Automotive steel buying is currently below expectations because of the walkouts at Ford and lingering effects of the strikes against General Motors Corp.

Ford and Chrysler are buying cautiously, and the settlement at GM hasn't caused that company to release as much tonnage as steelmakers anticipated.

Steel sales executives have two theories—either automotive steel inventories are bigger than they estimated, or automakers have no intention of boosting their October output enough to make up for the production they lost in September. A new provision written into the labor contract may foreshadow fewer ups and downs in auto production scheduling: In short workweeks, automakers must pay benefits equal to 65 per cent of wages for hours worked less than 40.

MILLS STILL HOPEFUL—Quick settlement of the remaining auto labor disputes will allow the industry to build about 560,000 cars this month (vs. only 354,000 in September). If new model sales are good, automakers will probably order more steel for November delivery than they'll take this month. Until they step up their purchases, the steel market will have a hard time getting off dead center. Reasons: 1. Other users are keeping their inventories low and counting on suppliers to meet their demands for fast service. (Deliveries on all products except heavy plates and galvanized sheets are prompt.) 2. Demand for tin plate is declining as the canning season wanes. 3. Orders for oil country goods are off, following a spurt in August. Buyers in Texas are chewing up the extra tonnage they bought before Sept. 1, so that they could avoid a 2 per cent state sales tax affective on that date.

SIGNS OF STRENGTH— Despite the current slowness, steelmakers are cheered by uptrends in major markets. Optimists note:

- August orders for fabricated structural steel were 31 per cent greater than those of August, 1960.
- August awards for future construction topped those of August, 1960, by 8 per cent and set a record for the month.
- New orders received by manufacturers hit an all-time high in August, surpassing the monthly record set in June, 1959.
- Factory inventories increased by $450 million in August, scoring the biggest monthly advance since that of March, 1960.

RECORD YEAR AHEAD?— Barring an extended strike, the steel industry's 1962 production will be between 110 million and 115 million ingot tons, predicts Robert M. Buddington, vice president of sales, Inland Steel Co. He sees an "outside chance" that 1955's record annual production of 117 million tons will be equaled. He looks for moderate inventory building, plus heavy consumption by automakers, construction, machinery builders, and appliance manufacturers.

The steelmakers on STEEL's Panel of Economic Consultants believe next year's ingot production will shape up like this in the first three quarters: First quarter, 30.4 million tons, second quarter, 32.4 million, third quarter, 23.9 million.

PRODUCTION EDGES UP—Look for ingot production in the week ending Oct. 14 to be slightly higher than the 2,131,000 tons that STEEL estimates the industry poured in the week ended Oct. 7. Output then was unchanged from the previous week's.

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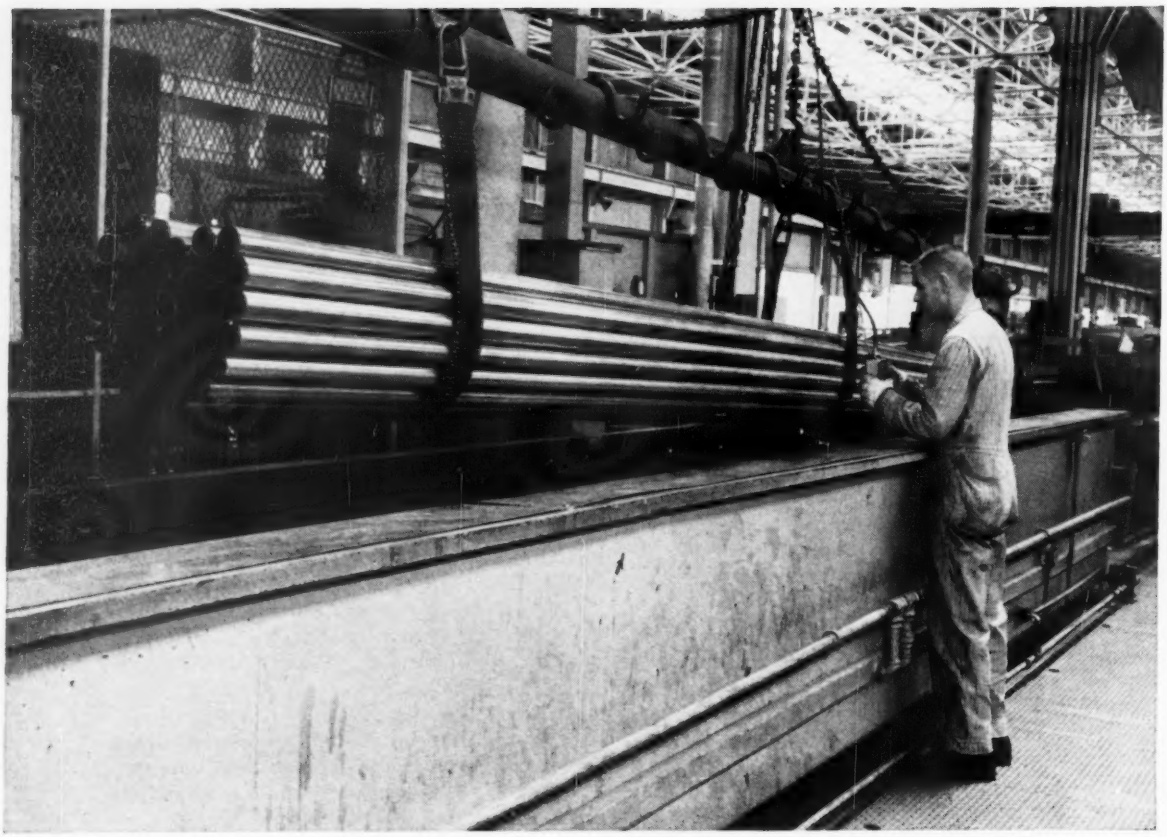


Tubes ready for a Nialk Trichlor degreasing bath at Wolverine Tube Division of Calumet & Hecla, Inc., Decatur, Alabama.

HOW WOLVERINE TUBE CUTS DOWN DEGREASER CLEANOUTS

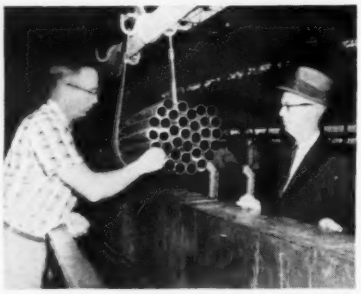
Cleaning the inside of a one-inch by thirty-foot copper tube sets up a problem.

Yet Wolverine Tube, Division of Calumet & Hecla, Inc., removes dirt and chips from these and gets them immaculate while maintaining widely spaced cleanout schedules.

The answer lies in the utilization of Hooker's Nialk® TRICHLORethylene, the solvent with *psp*—permanent staying power—in its stabilizer.

It keeps the bath from going acid, even with bits of metal in it. And it lets Wolverine use baths for tube operations three months before cleanout.

The tubes are cleaned at many stages. "We cannot use a solvent that might stain the walls of the tubing," says Dalton F. Jackson, metallurgist in the technical section. "Nialk Trichlor does not stain."



D. F. Jackson (L) of Wolverine and W. A. Ames (R) of Wittichen Chemical Company, Birmingham, Alabama, distributor for Nialk Trichlorethylene, examine degreased tubing.

Wolverine finds the system of degreasing tubes in vapor of Nialk Trichlor and then spraying them with pure condensate of the same solvent highly efficient.

The contaminated solvent from the degreaser is distilled and re-used. "Even after distilling it many times, Nialk still maintains a highly effective degreasing potential," Jackson says.

He is very satisfied with Hooker's technical service. "Whenever we have called for help, they have sent a representative promptly."

You can have the same benefits—regardless of the metals you're working with.

Talk to your Hooker Chemical distributor. Or write us. Our years of experience are yours for the asking.

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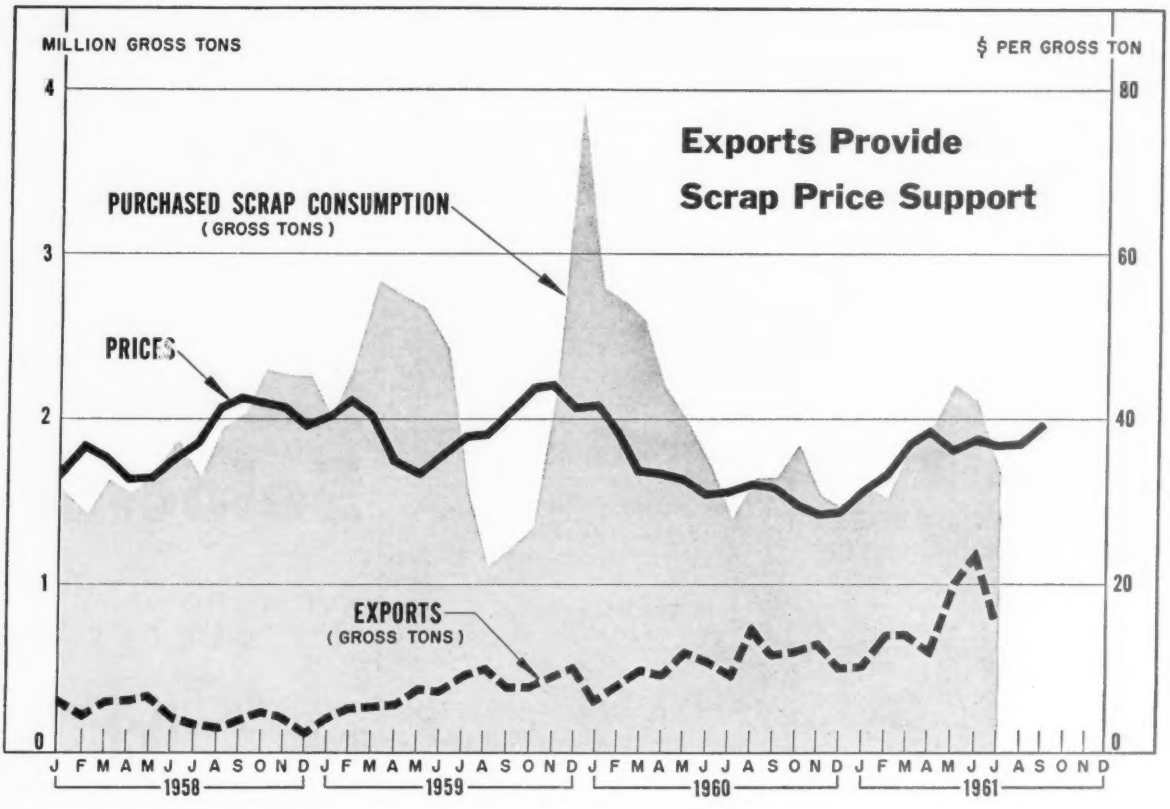

Look for Plateau in Scrap Prices

SCRAP CONSUMPTION should be high this fall and winter because of the expected strength in steel production, but it's unlikely that scrap prices will be up proportionately.

Many observers think prices will stay around present levels because increased needs will probably be met by hot metal from blast furnaces now idle. (There were 105 inactive stacks on Sept. 1.)

Some even think that prices could weaken if scrap exports continue to dip. July exports, for example, were down to 793,000 tons, a 35 per cent drop from the June total.

Another factor: Historically, scrap consumption was tied directly to the steelmaking pace. Oxygen converter steelmaking has reduced over-all scrap requirements.

• **Significance** — One-third of the annual scrap crop is generated in the nation's industrial plants, so the price trend is of more than academic interest to thousands of metalworking managers.

• **Current Market**—Scrap prices are leveling out after a jagged, nine month climb to the highest monthly average in almost two years. STEEL's composite on No. 1 heavy melting (the bellwether steelmaking grade) has jumped more than 37 per cent since the first of the year. The monthly average went up from $28.92 a gross ton last December to $39.75 in September. You have to go back to January, 1960, to find a higher average ($41.92).

This year's price trend reverses the 1960 downtrend. It has been sparked by heavier domestic consumption brought about by the recovery in steelmaking (a gain of about 22 percentage points since the beginning of the year, based on the 1960 ingot capacity rating) and by a record export movement.

• **Slowing Down**—But the price upswing has slowed noticeably since midyear. The composite went up more than $6 a ton in the first six months, but it has risen less than $2 since. Through most of September, it held unchanged, despite the rise in steel production to the highest level since May, 1960.

Consumer resistance to higher prices is increasing despite the promising outlook for steelmaking the rest of this year. The recent

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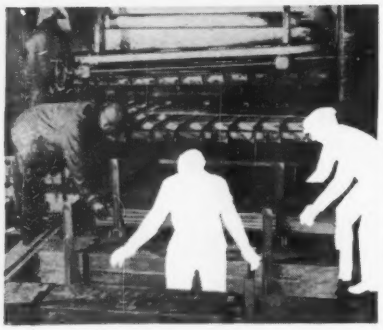

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stepup in blast furnace operations evidences rising competition for scrap from hot metal. Since the start of March, about when the scrap price composite broke through $35, about 31 idle blast furnaces have been reactivated, and more are being readied for resumption.

• **Moot Question**—Many scrapmen think $35 is the point at which it becomes more economical for steelmakers to use blast furnace hot metal in preference to purchased scrap. Use of hot metal traditionally increases as scrap prices rise. Government statistics bear that out.

Latest data (July) show a drop in the ratio of scrap to pig iron in furnace melts, 46 per cent scrap vs. 54 pig iron, compared with 49 scrap and 51 pig iron in June. During May, the amounts of each were equal, but for eight months prior to May the ratio favored scrap, 52 to 48.

• **Exports Figure** — Scrap prices have held up despite increasing preference for hot metal (see chart). Needed market support has come from unusually heavy exports. June shipments of 1,210,000 gross tons set a monthly record, and the January-July total of 5,522,000 tons far exceeded the 3,259,000 shipped out of the country in the same period of 1960, the record year for scrap exports (6.4 million tons).

Scrap's export curve has been moving upward the last several years, but this country has been a major exporter throughout modern history. Exports are a market bracer in times of sluggish domestic demand.

Iron Ore . . .

Iron Ore Prices, Page 194

Hanna Mining Co., Cleveland, will increase the annual capacity of its Groveland iron ore concentrating plant on the Menominee Range near Iron Mountain, Mich., from 700,000 to 1,500,000 tons. It will install facilities to produce 1,250,000 tons of high grade, partially fluxed ore pellets annually.

Shipments of Lake Superior iron ore from the head of the lakes in September totaled 9,026,216 gross tons, up 650,540 tons from shipments in the like month a year ago, reports the American Iron Ore As-

1961 EDITION

Metal Selector

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Oct. 16

STEEL

Some 2000 alloys will be listed in the most up-to-date compendium available anywhere. More than 1000 changes have been made since the 1960 edition. The biggest: The addition of a section on refractory metals and the use of the copper industry's new number system for copper alloys.

Bound reprints will be available at 50 cents a copy; prices for larger quantities may be had on request. Write Reprint Dept., STEEL, Penton Bldg., Cleveland 13, Ohio.

sociation. The 1961 season movement cumulative to Oct. 1 was 43,114,280 gross tons, down 17,572,053 tons from shipments of 60,686,333 to the same date in the 1960 season.

Iron Ore Stocks Are Off From Total Held Year Ago

Stocks of iron ore in the U. S. and Canada (from all sources) at the end of August totaled 71,043,540 gross tons, slightly less than the 71,966,476 tons held at the end of August a year ago, reports the American Iron Ore Association.

Lake Superior (U. S.) ore stocks were 41,869,687 tons vs. 42,523,937 a year ago; other U. S. ores, 3,289,300 vs. 3,726,586; Canadian Lake Superior, 2,295,878 vs. 2,153,058; other Canadian, 5,137,849 vs. 6,458,273; other foreign ores, 18,450,826 vs. 17,104,622.

Ore consumption in August amounted to 9,410,390 tons compared with 7,221,595 in the same month last year. Total consumption in the first eight months this year was 65,128,546 tons vs. 81,376,490 in the same 1960 period.

Pig Iron . . .

Pig Iron Prices, Page 193

Merchant pig iron sales gained in September and will rise further this month. Business, however, remains spotty. Buying by domestic consumers is hand to mouth. Export demand has tapered.

Youngstown Sheet & Tube Co. has lighted a blast furnace at its Brier Hill Works, but is blowing out one at the Campbell Works for relining.

Plates . . .

Plate Prices, Page 188

Tank and boiler fabricators are stepping up their plate requirements. Similarly, the shipbuilding and chemical industries are providing fairly strong demand. Chemical industry alloy plate needs are particularly noticeable. Slightly heavier orders from the Naval shipyards also include a higher ratio of alloy plates, notably grade Hy-80.

In general, fabricating shops appear to be holding their orders for plates close to bookings of fabricated work. Mill deliveries are little

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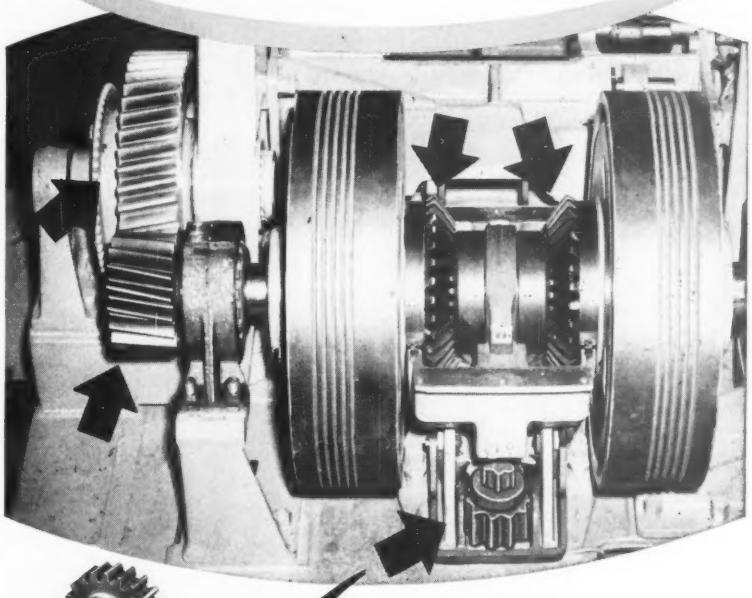

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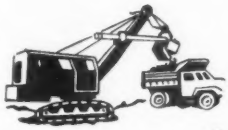

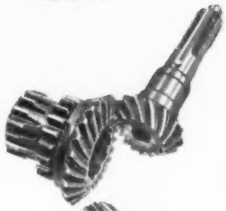

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changed; sheared plates average around three weeks, alloy plates four to five weeks.

Sandvik Offering Spring Steel up to 48 in. Wide

Cold rolled, hardened and tempered spring steel with a tensile strength of 170,000 psi and Rockwell hardness of 38, in widths up to 48 in. and in any desired length, is being offered by Sandvik Steel Inc., Fair Lawn, N. J. It's available in a gray hardened finish only.

Sheets, Strip . . .

Sheet & Strip Prices, Page 189 & 190

Moderate improvement in sheet steel demand continues, but volume is not up sufficiently to noticeably tighten mill deliveries. Hot rolled sheets can be had in two to three weeks, cold rolled in two to five weeks. Enameling stock deliveries range four to five weeks, electrical sheets around four weeks. Galvanized sheet shipments are the most extended; some producers are booked up into late November; one mill's bookings extend into December.

Orders fall short of expectations, partly because of the backing up of automotive business due to labor trouble. It's now thought the bulge in buying will not come until November. But October order volume is expected to better that of September by about 10 per cent.

Net Price Catalog Issued For Tubular, Split Rivets

A catalog of prices based on the net pricing system introduced in the tubular and split rivet industry a few weeks ago by Tubular Rivet & Stud Co., Quincy, Mass., is being distributed.

The system (see STEEL, Aug. 14, p. 177) replaces the list price and discount method which had been used by the company. List prices and discounts have been conventional in the tubular rivet and stud industry.

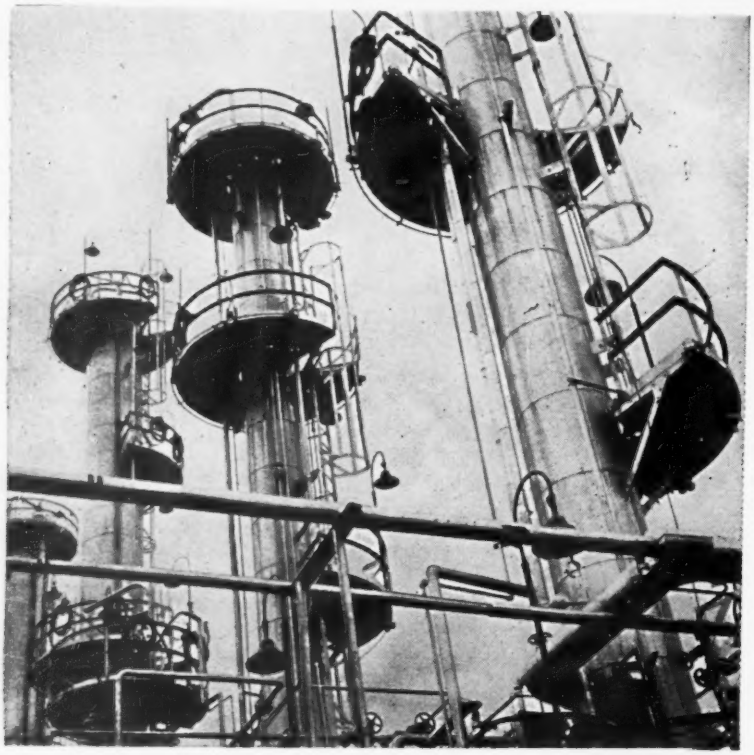
TRS instituted the system so purchasing agents, designers, and engineers can ascertain prices easily, speedily, and accurately.

TRS's eight page catalog, which covers semitubular rivets, split rivets, rivet caps, and outside-pronged rivets, provides descriptions, size specifications, and net prices of more than 150 popular styles made from aluminum, brass, stainless steel, and carbon steel. Sizes listed range from 3/64 to 3/8 in. body diameter by 3/16 to 20/16 in. body length. Also shown are the net finish charges and quantity schedule.

The net prices do not represent any change in prices. They are current list prices converted to net prices for ready reference. TRS says the catalog will eliminate customer error in selecting the wrong discounts for rivets and finishes and end the need for computations to arrive at a price.

The switch was made by TRS after it did a survey of preferences among buyers, designers, and engineers.

Copies of the catalog are available from D. W. Schluter, the company's manager of advertising and market research.



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Steel Bars . . .

Bar Prices, Page 188

Further slight improvement in demand for commercial steel bars is noted. Buying is diversified and is edging upward noticeably in some areas of consumption. More tonnage is going into forgings and light toolwork. Defense requirements are heavier, and the service centers are specifying more freely. Automotive needs are restricted but are moving upward slowly.

Deliveries of hot carbon bars are promised by the mills in two to four weeks, unchanged from the schedule that has prevailed for some time. Cold drawn bars are moving moderately well, but on a hand to mouth basis.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 189

Producers of reinforcing steel are still booking substantial business, but volume is expected to begin shrinking with the seasonal slump in building activity beginning. Bad weather in some areas is already hampering construction activities. Some mill shipments of reinforcing bars have been held up temporarily.

Building mesh demand is not expected to be as strong this month as it was during September.

Wire . . .

Wire Prices, Pages 190 & 191

While wire rods are moving well on mill delivery promises of two to three weeks, orders for industrial grades of wire have leveled off; shipment promises range one to five weeks, depending on processing. A seasonal decline in demand for merchant wire products is underway, and demand for manufacturers' wire and building wire items is not sufficient to offset the sag in volume.

Stainless Steel . . .

Stainless Steel Prices, Page 192

Carpenter Steel Co., Reading, Pa., has expanded and diversified its line of stainless steels and high alloy tubular products. With the recent acquisition of NTH Products Inc., El Cajon, Calif., Carpenter now offers a broad line of thin wall welded tubing. It is in addition to extruded seamless and welded stainless high alloy tubing and pipe manufactured at the company's Union, N. J., mill.

The West Coast plant continues under its present management. It manufactures thin wall tubing in more than 80 grades of corrosion and heat resisting stainless steels, precipitation hardening stainless, high temperature alloys, heat treatable alloy steels, and reactive alloys. Included in the line are many of the newer specialized metals, such as zirconium, titanium, tantalum, and columbium.

Ferroalloys . . .

Ferroalloy Prices, Page 195

Spiegeleisen will be produced next year in a new electric furnace developed by New Jersey Zinc Co. at its Palmerton, Pa., smelter. Upon completion of the operation, the company will switch its entire blast furnace production of the alloy to the new system.

Production of silicon alloys in the second quarter this year totaled 146,647 net tons, a gain of 17 per cent compared with output of 125,-

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353 tons in the first quarter, reports the U. S. Bureau of Mines. Shipments in the second quarter amounted to 163,340 tons, up 25 per cent from the 131,184 tons moved in the preceding quarter.

Ferrochrome Alloy Prices Raised by Union Carbide

Prices on ferrochrome alloys were raised an average of less than 2 cents a pound of chromium by Union Carbide Metals Co., New York, a division of Union Carbide Corp. The new prices go into effect on shipments made on and after Oct. 15.

The new schedule includes those grades of charge chrome preferred by the steel industry. The prices include a premium for the 0.025 per cent carbon grade of low carbon ferrochrome and the 0.01 per cent carbon grades of Simplex alloys, necessitated by the rigid control of raw material specifications.

Also, the schedule reflects technical progress in producing the 0.05 per cent carbon grade of ferrochrome and the 0.025 per cent carbon grades of Simplex ferrochromes. The premium for the lower carbon ranges of these alloys is no longer necessary, the company advised the trade.

Further, the new schedule takes into account the penalty which a stainless steel producer experiences in using the higher silicon grades of low carbon ferrochrome—they limit the extent to which he can use lower cost chromium in the form of ferrochrome-silicon. Computer techniques determined the penalty to be about ½ cent a pound of chromium, and the new prices allow for it.

Tin Plate . . .

Tin Plate Prices, Page 190

National Steel Corp. is offering its lightweight tin plate in the full range of electrolytic coatings. It's available in base weights of 45, 50, 55, and 60 lb from two National Steel divisions: Weirton Steel, with plants in Weirton, W. Va., and Steubenville, Ohio, and Midwest Steel, with a plant at Portage, Ind.

The production of lightweight tin plate, which the company calls Weirlite, involves two, separate cold rolling operations. The resulting coils are then given tin coatings. National recently let contracts for a two-stand tandem cold mill and auxiliary facilities for the production of this product.

In the full range of coating weights, Weirlite prices are based on coils of 12,000 lb minimum and over.

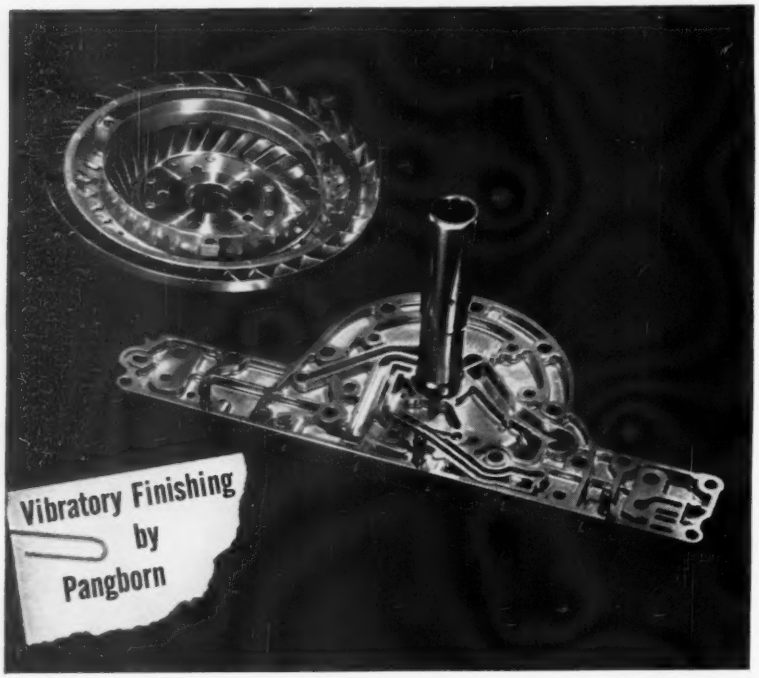
Tubular Goods . . .

Tubular Goods Prices, Page 192

Demand for buttweld pipe is reported holding up well, but September shipments were down some from the volume moved in August. Seasonal slackening is expected as the fall advances.

Some mill order books on buttweld are fuller than they were a month ago, partly because of delayed shipments to areas hit by Hurricane Carla.

After spurting in August, demand for oil country goods has weakened. Texas buyers took in extra tonnage



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before Sept. 1 to escape a 2 per cent sales tax that went into effect that date. By so doing they saved $5 a ton.

The outlook for tubing, casing, and drill pipe is encouraging and should remain so the next nine months.

Structural Shapes . . .

Structural Shape Prices, Page 188

Although the building season is advancing, structural activity continues to be one of the main props of the steel market. Volume is being fairly well sustained, and while it is comprised largely of public work, there continues to be a good sprinkling of commercial and industrial work.

Prices on fabricated and erected structural steel are subject to sharp competition. Some fabricators are not making any attempt to meet the low prices quoted, and as a result their order backlogs are down noticeably.

August shipments of fabricated structural steel were 359,467 tons, an increase of 25 per cent over the previous month, but down from the same month a year ago. Total shipments for the first eight months this year were 2,505,344 tons, almost in line with the industry's performance in the same period of 1960 when 2,546,879 tons were shipped. Backlogs as of Aug. 31 were 2,377,515 tons, of which 1,310,015 tons (55 per cent) were scheduled for fabrication within the four months ending Dec. 31.

Transmission towerwork in Ohio and Indiana, involving two projects and estimated as requiring 8100 tons of steel, will be constructed partly of aluminum, with tonnage for the remaining steel structures going to S.A.E., Milan, Italy. Participating in the aluminum fabrication are Kaiser Aluminum Co., working with ACF Industries, New York, and Michael Flynn Mfg. Co., Philadelphia.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

1285 tons, railroad subway structure over South Expressway, near Pershing Road, Chicago, to Allied Structural Steel Co., Chicago.

1725 tons, bridge over Cannonsville Reservoir, Delaware and Orange Counties, New York, through Walsh Construction Co., general contractor, to Ingalls Iron Works, Birmingham. Project is for the Board of New York Water Supply.

1500 tons, Brant sugarhouse, Brant, Fla., to Aetna Steel Co., Atlanta, Ga.

630 tons, coal conveyor system, Indiana & Michigan Electric Co. and American Electric Power Service Corp., Lawrenceburg, Ind., to B. L. Montague.

510 tons, six story office building, Harold Menowitz, Queens County, New York, to the Lieb Iron Works.

500 tons, warehouse and office, General Motors Corp., North Brunswick, N. J., to Keystone Structural Steel Co., Trenton, N. J., through Fred J. Brotherton.

200 tons, French Slough flood control, Snohomish County, Wash., to Pacific Car & Foundry Co., Seattle; Wayne Construction Co., Seattle, general contractor.

STRUCTURAL STEEL PENDING

8385 tons, state highwaywork, FABWE 61-30, Queens County, New York; bids closed Oct. 5.

2500 tons, post office and customhouse, St. Paul; E. M. F. Construction Co., New York, low on the general contract.

2460 tons, state highway, PSC-10324, Nassau County, New York; bids closed Oct. 5.

1500 tons, Walt Whitman Shopping Center, Huntington, N. Y.; Winston-Muss Corp., general contractor.

1300 tons, Beebe Bridge, Columbia River, Washington State; bids to Olympia, Wash., Oct. 17.

1125 tons, state highwaywork, FIWE 61-1, Queens County, New York; bids closed Oct. 5.

780 tons, Montana State bridge, Missoula; Sletten Construction Co., Great Falls, Mont., is low bidder at $988,381.

753 tons, state highwaywork, FAGEP 61-4, Queens County, New York; bids opened Oct. 5.

655 tons, state highwaywork, FAGCP 61-3, Queens County, New York; bids closed Oct. 5.

553 tons, state highwaywork, FAC 61-18 and Fash 61-18, Tompkins County, New York; bids closed Oct. 5.

500 tons, Citizens Plaza, St. Petersburg, Fla.; George A. Fuller Co., engineer.

475 tons, Public School No. 242, Brooklyn, N. Y.; indefinitely withdrawn.

450 tons, state bridgework, FASS 61-10, Erie County, New York; bids closed Oct. 5.

349 tons, three bridges, Hampden, Maine; Thomas DiCenzo, Calais, Maine, general contractor; also, 166 tons of concrete reinforcing bars.

322 tons, state highway, FILME 61-2, New York County, New York; withdrawn.

300 tons, Public School No. 309, Brooklyn, N. Y.; indefinitely withdrawn.

260 tons, two additions to Swedish Hospital, Seattle; John H. Sellen Construction Co., Seattle, low at $1,832,100.

192 tons, state bridgework, Adams County, Pennsylvania; bids Oct. 27; also, 90 tons of reinforcing bars required.

188 tons, bridge structures, Shoreham, Vt.; Olson Construction Corp., Montpelier, Vt., general contractor; also, 45 tons of concrete reinforcing bars required.

131 tons, two state bridges, Belfast, Maine; the Bridge Construction Corp., Augusta, Maine, general contractor; also, 67 tons of concrete reinforcing bars.

102 tons, including concrete reinforcing bars, steel beam bridge, Moosup River, Plainfield, Conn.; bids Oct. 16 to Hartford, Conn.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1700 tons, 1000 tons for Clark Canyon project, and 700 tons for Barrett Dam near Dillon, Mont., to unstated eastern interests; general contracts awarded by the U. S. Bureau of Reclamation.

475 tons, Theodore Roosevelt Bridge, Washington, through McCloskey & Co., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa. This project was previously referred to as being in Philadelphia.

220 tons, municipal garages, Atlantic City, N. J., to Bethlehem Steel Co., Bethlehem, Pa.

175 tons, state bridgework, Lebanon County, Pennsylvania, through G. A. & F. C. Wagman, Dallastown, Pa., to Bethlehem Steel Co., Bethlehem, Pa.

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120 tons, underground parking garage, Harrisburg, Pa., through H. P. Alexander & Co., Harrisburg, to Bethlehem Steel Co., Bethlehem, Pa.

J&L Expands at Cleveland

Jones & Laughlin Steel Corp.'s largest blast furnace (50,000 cu ft working volume) is scheduled to go into operation at the Cleveland Works early in 1963. It will have a hearth diameter of more than 28 ft.

The furnace will be constructed by Kopper Co. Inc., Pittsburgh (STEEL, Oct. 2, p. 12) and will use high capacity burners fired in multiples in the blast furnace stoves. "This development will provide higher blast temperatures without the massive stove construction previously required," says Avery C. Adams, chairman.

Near Record Steel Output Is Predicted for 1962

Near record steel production in 1962—110 million to 115 million tons—is predicted by Robert M. Buddington, sales-vice president, Inland Steel Co., Chicago. In evaluating the industry's prospects for the National Industrial Conference Board, he made one reservation: That pace will be realized if there isn't an extended steel strike next year.

Mr. Buddington looks for a booming first half and a slower second half. The possibility of a steel strike is the most important factor in the outlook. Barring a strike, he thinks there's an outside chance that 1955's record production of 117 million tons might be equaled.

Steel Ingot Output Holds Steady

LABOR conditions in the automotive industry continue to keep the steel industry from attaining anticipated production levels. The rise in ingot output since July would have been steeper had the automakers taken all the tonnage required under original schedules.

Steel ingot output for the week ended Oct. 7 is estimated at 2,131,000 tons, unchanged from the preceding week's total.

• **Chicago**—Ingots were produced during the week ended Oct. 7 at a rate estimated at 75 per cent of 1960 capacity. That compares with close to 76 per cent the previous week. Several mills have been overshooting projections during recent weeks.

• **Youngstown**—Weekly production continues close to 170,000 tons, or about 68 per cent of 1960 capacity. Some plants are troubled with hold instructions on shipments to automotive plants, but they are running other orders around them.

• **Buffalo**—Steel operations are about 61 per cent of 1960 capacity. Automotive labor peace is expected to result in an expansion in October steel production.

• **Cincinnati**—Ingot output has been holding at about 80 per cent of 1960 capacity. A drop of 1 or 2 points is expected the week ended Oct. 7.

• **Los Angeles**—Rising seasonal demand for steel hiked the Western district operating rate for the week ended Oct. 7 to 84 per cent of 1960 capacity.

• **Philadelphia**—Operations in the Northeastern district are running a zigzag course. Indications point to an upturn for the week ended Oct. 7, following a drop of 5 points in the AISI index to 113 for the week ended Sept. 30.

• **Pittsburgh**—Ingot production for the week ended Oct. 7 held steady at about 73 per cent of 1960 capacity. Output the previous week came to 431,795 tons, highest for any week since that ended May 21, 1960.

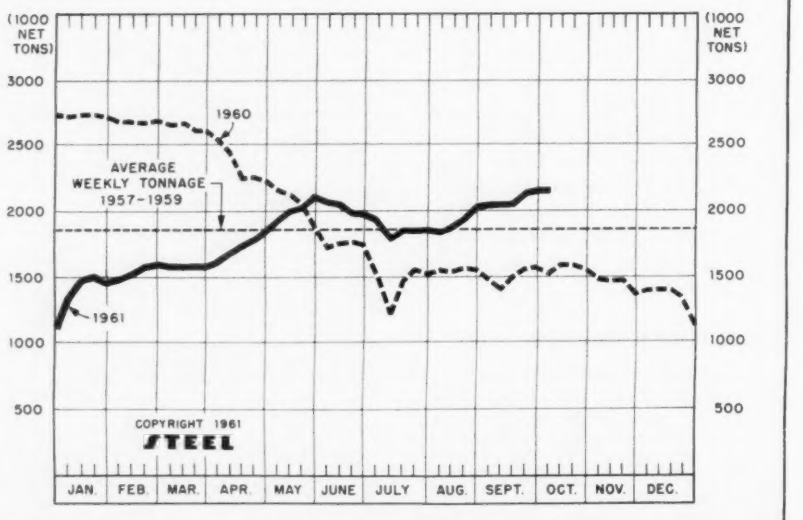
• **Cleveland**—Production of ingots continues to rise gradually and is at the highest level since mid-April, 1960.

STEEL INGOT PRODUCTION

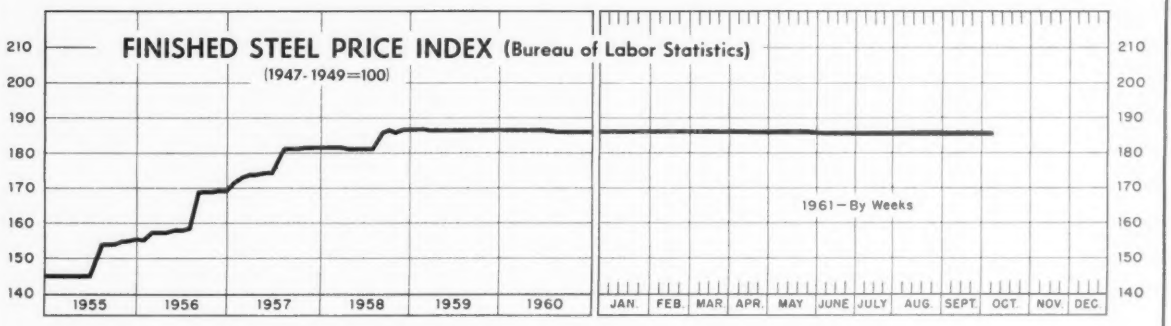
Weeks Ended	Net Tons	Change
Oct. 7	2,131,000*	0
Sept. 30	2,131,000	+ 0.8%
Sept. 23	2,114,000	+ 4.0%
Totals to Sept. 30		
1961	70,449,000	−11.7%
1960	79,801,000	

DISTRICTS	Week Ended —Sept. 30— Tons‡	Index†	Week Ended Sept. 23 Index†
Northeastern	301,931	113	118
Buffalo	100,276	103	99
Pittsburgh	431,795	107	106
Youngstown	169,981	100	100
Cleveland	137,041	148	142
Detroit	154,228	147	148
Chicago	426,447	114	116
Cincinnati	97,272	129	124
St. Louis	59,907	114	89
Southern	117,068	108	101
Western	134,450	115	114
Industry	2,131,000	114.4	113.5

*Estimated by STEEL.
†1957-59 (1,862,933 tons) = 100.
‡District tonnages are approximate and will not necessarily add to the national total.



Price Indexes and Composites



Oct. 3, 1961	Week Ago	Month Ago	Sept. Index	Year Ago
185.4	185.4*	185.5*	185.4*	186.2

*Revised.

AVERAGE PRICES OF STEEL (Bureau of Labor Statistics)

Week Ended Oct. 3

Prices include mill base prices and typical extras and deductions. Units are 100 lb except where otherwise noted in parentheses. For complete description of the following products and extras and deductions applicable to them, write to STEEL.

Rails, Standard No. 1	$5.825
Rails, Light, 40 lb	7.292
Tie Plates	6.875
Axles, Railway	10.175
Wheels, Freight Car, 33 in. (per wheel)	62.000
Plates, Carbon	6.350
Structural Shapes	6.167
Bars, Tool Steel, Carbon (lb)	0.560
Bars, Tool Steel, Alloy, Oil Hardening Die (lb)	0.680
Bars, Tool Steel, H.R. Alloy, High Speed, W 6.75, Cr 4.5, V 2.1, Mo 5.5, C 0.060 (lb)	1.400
Bars, Tool Steel, H.R. Alloy, High Speed, W18, Cr 4, V 1 (lb)	1.895
Bars, H.R., Alloy	10.775
Bars, H.R., Stainless, 303 (lb)	0.543
Bars, H.R., Carbon	6.675
Bars, Reinforcing	(N.A.)
Bars, C.F., Carbon	10.710
Bars, C.F., Alloy	14.125
Bars, C.F., Stainless, 302 (lb)	0.570
Sheets, H.R., Carbon	6.350
Sheets, C.R., Carbon	7.300
Sheets, Galvanized	8.775
Sheets, C.R., Stainless, 302 (lb)	0.643
Sheets, Electrical	12.625
Strip, C.R., Carbon	9.225
Strip, C.R., Stainless, 430 (lb)	0.460
Strip, H.R., Carbon	6.250
Pipe, Black, Buttweld (100 ft)	19.495
Pipe, Galv., Buttweld (100 ft)	23.098
Pipe Line (100 ft)	195.423
Casing, Oil Well, Carbon (100 ft)	193.028
Casing, Oil Well, Alloy (100 ft)	202.645
Tubes, Boiler (100 ft)	51.200
Tubing, Mechanical, Carbon (100 ft)	27.005
Tubing, Mechanical, Stainless, 304 (100 ft)	192.285
Tin Plate, Hot-dipped, 1.25 lb (95 lb base box)	10.100
Tin Plate, Electrolytic, 0.25 lb (95 lb base box)	8.800
Black Plate, Canmaking Quality (95 lb base box)	7.900
Wire, Drawn, Carbon	10.575
Wire, Drawn, Stainless, 430 (lb)	0.665
Bale Ties (Bundles)	7.647
Nails, 8d Common (50 lb)	4.715
Wire, Barbed (80-rod spool)	8.372
Woven Wire Fence (20-rod roll)	20.910

STEEL's FINISHED STEEL PRICE INDEX

	Oct. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Index (1935-39 avg = 100)	247.82	247.82	247.82	247.82	225.71
Index in cents per lb	6.713	6.713	6.713	6.713	6.114

STEEL's ARITHMETICAL PRICE COMPOSITES

Finished Steel, NT	$149.96	$149.96	$149.96	$149.96	$137.75
No. 2 Fdry, Pig Iron, GT	66.49	66.49	66.49	66.49	62.63
Basic Pig Iron, GT	65.99	65.99	65.99	65.99	62.18
Malleable Pig Iron, GT	67.27	67.27	67.27	67.27	63.41
Steelmaking Scrap, GT	39.50	39.83	39.50	30.67	57.00

Comparison of Prices

Comparative prices by districts in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED STEEL	Oct. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bars, H.R., Pittsburgh	5.675	5.675	5.675	5.675	5.075
Bars, H.R., Chicago	5.675	5.675	5.675	5.675	5.075
Bars, H.R., deld., Philadelphia	5.98	5.98	5.98	5.975	4.93
Bars, C.R., Pittsburgh	7.65	7.65	7.65	7.65	6.85
Shapes, Std., Pittsburgh	5.50	5.50	5.50	5.50	5.00
Shapes, Std., Chicago	5.50	5.50	5.50	5.50	5.00
Shapes, deld., Philadelphia	5.745	5.745	5.745	5.77	5.00
Plates, Pittsburgh	5.30	5.30	5.30	5.30	4.85
Plates, Chicago	5.30	5.30	5.30	5.30	4.85
Plates, Coatesville, Pa.	5.30	5.30	5.30	5.30	5.25
Plates, Sparrows Point, Md.	5.30	5.30	5.30	5.30	4.85
Plates, Claymont, Del.	5.30	5.30	5.30	5.30	5.35
Sheets, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Sheets, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Sheets, C.R., Pittsburgh	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Chicago	6.275	6.275	6.275	6.275	5.75
Sheets, C.R., Detroit	6.275	6.275	6.275	6.275	5.75-5.85
Sheets, Galv., Pittsburgh	6.875	6.875	6.875	6.875	6.30
Strip, H.R., Pittsburgh	5.10	5.10	5.10	5.10	4.675
Strip, H.R., Chicago	5.10	5.10	5.10	5.10	4.675
Strip, C.R., Pittsburgh	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Chicago	7.425	7.425	7.425	7.425	6.85
Strip, C.R., Detroit	7.425	7.425	7.425	7.425	6.95
Wire, Basic, Pittsburgh	8.00	8.00	8.00	8.00	7.20
Nails, Wire, nonstock, Pitts.	8.95	8.95	8.95	8.95	8.35
Tin Plate (1.50 lb) box, Pitts.	$10.65	$10.65	$10.65	$10.65	$9.85

SEMIFINISHED STEEL					
Billets, forging, Pitts. (NT)	$99.50	$99.50	$99.50	$99.50	$91.50
Wire rods, $\frac{7}{32}$-$\frac{9}{16}$" Pitts.	6.40	6.40	6.40	6.40	5.80

PIG IRON, Gross Ton	Oct. 4 1961	Week Ago	Month Ago	Year Ago	5 Yr Ago
Bessemer, Pittsburgh	$67.00	$67.00	$67.00	$67.00	$63.50
Basic, Valley	66.00	66.00	66.00	66.00	62.50
Basic, deld., Philadelphia	70.18	70.18	70.18	70.07	66.26
No. 2 Fdry, Neville Island, Pa.	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, Chicago	66.50	66.50	66.50	66.50	63.00
No. 2 Fdry, deld., Phila.	70.68	70.68	70.68	70.57	66.76
No. 2 Fdry, Birmingham	62.50	62.50	62.50	62.50	59.00
No. 2 Fdry (Birm.), deld., Cin.	70.20	70.20	70.20	70.20	66.70
Malleable, Valley	66.50	66.50	66.50	66.50	63.00
Malleable, Chicago	66.50	66.50	66.50	66.50	63.00
Ferromanganese, net ton†	245.00	245.00	245.00	245.00	215.00

†74-76% Mn, Duquesne, Pa.

SCRAP, Gross Ton (Including broker's commission)					
No. 1 Heavy Melt, Pittsburgh	$37.50	$37.50	$37.50	$28.50	$56.50
No. 1 Heavy Melt, E. Pa.	40.50	40.50	40.50	35.00	56.50
No. 1 Heavy Melt, Chicago	40.50	41.50	40.50	28.50	58.00
No. 1 Heavy Melt, Valley	42.50	42.50	41.50	30.50	64.50
No. 1 Heavy Melt, Cleve.	38.50	38.50	38.50	28.50	63.00
No. 1 Heavy Melt, Buffalo	32.50	32.50	31.50	27.50	57.50
Rails, Rerolling, Chicago	61.50	61.50	61.50	52.50	83.00
No. 1 Cast, Chicago	44.50	44.50	43.50	38.50	51.50

COKE, Net Ton					
Beehive, Furn., Connlsvl.	$15.00	$15.00	$15.00	$15.00	$14.50
Beehive, Fdry., Connlsvl.	18.25	18.25	18.25	18.25	17.50
Oven, Fdry., Milwaukee	32.00	32.00	32.00	32.00	29.50

Steel Prices

Mill base prices reported to STEEL, Oct. 4, cents per pound except as otherwise noted. *Changes shown in italics.* Code number following mill point indicates producing company. Key to producers, page 189; footnotes, page 191.

SEMIFINISHED

INGOTS, Carbon Forging (NT)

Munhall,Pa. U5 .....$76.00

INGOT, Alloy (NT)

Detroit S41 .....$82.00
Economy,Pa. B14 ....82.00
Farrell,Pa. S3 .....82.00
Lowellville,O. S3 .....82.00
Midland,Pa. C18 .....82.00
Munhall,Pa. U5 .....82.00
Sharon,Pa. S3 .....82.00

BILLETS, BLOOMS & SLABS Carbon Rolling (NT)

Bartonville,Ill. K4 ....$82.00
Bessemer,Pa. U5 .....80.00
Buffalo R2 .....80.00
Clairton,Pa. U5 .....80.00
Ensley,Ala. T2 .....80.00
Fairfield,Ala. T2 .....80.00
Fontana,Calif. K1 ....90.50
Gary,Ind. U5 .....80.00
Johnstown,Pa. B2 ....80.00
Lackawanna,N.Y. B2..80.00
Munhall,Pa. U5 .....80.00
Owensboro,Ky. G8 ....80.00
S.Chicago,Ill. R2, U5..80.00
S.Duquesne,Pa. U5 ...80.00
Sterling,Ill. N15 .....80.00
Youngstown R2 .....80.00

Carbon, Forging (NT)

Bessemer,Pa. U5 ....$99.50
Buffalo R2 .....99.50
Canton,O. R2 .....102.00
Clairton,Pa. U5 .....99.50
Conshohocken,Pa. A3 ..99.50
Ensley,Ala. T2 .....99.50
Fairfield,Ala. T2 .....99.50
Farrell,Pa. S3 .....99.50
Fontana,Calif. K1 ....109.00
Gary,Ind. U5 .....99.50
Geneva,Utah C11 .....99.50
Houston S5 .....104.50
Johnstown,Pa. B2 ....99.50
Lackawanna,N.Y. B2 ..99.50
LosAngeles B3 .....109.00
Midland,Pa. C18 .....99.50
Munhall,Pa. U5 .....99.50
Owensboro,Ky. C8 .....99.50
Seattle B3 .....109.00
Sharon,Pa. S3 .....99.50
S.Chicago R2, U5, W14..99.50
S.Duquesne,Pa. U5 ....99.50
S.SanFrancisco B3 ..109.00
Warren,O. C17 .....99.50

Alloy, Forging (NT)

Bethlehem,Pa. B2 ...$119.00
Bridgeport,Conn. C32..119.00
Buffalo R2 .....119.00
Canton,O. R2,T7 ....119.00
Conshohocken,Pa. A3 .121.00
Detroit S41 .....119.00
Economy,Pa. B14 ....119.00
Farrell,Pa. S3 .....119.00
Fontana,Calif. K1 ....140.00
Gary,Ind. U5 .....119.00
Houston S5 .....124.00
Ind.Harbor,Ind. Y1 ..119.00
Johnstown,Pa. B2 ....119.00
Lackawanna,N.Y. B2 .119.00
LosAngeles B3 .....139.00
Lowellville,O. S3 ....119.00
Massillon,O. R2 .....119.00
Midland,Pa. C18 .....119.00
Munhall,Pa. U5 .....119.00
Owensboro,Ky. G8 ....119.00
Seattle(6) B3 .....140.00
Sharon,Pa. S3 .....119.00
S.Chicago R2,U5,W14..119.00
S.Duquesne,Pa. U5 ...119.00
Struthers,O. Y1 .....119.00
Warren,O. C17 .....119.00

ROUNDS, SEAMLESS TUBE (NT)

Buffalo R2 .....$122.50
Canton,O. R2 .....125.00
Cleveland R2 .....122.50
Gary,Ind. U5 .....122.50
S.Chicago,Ill. R2,W14 122.50
S.Duquesne,Pa. U5 ...122.50
Warren,O. C17 .....122.50

SKELP

Aliquippa,Pa. J5 .....5.05
Benwood,W.Va. W10 ...5.05
Ind.Harbor,Ind. Y1 ....5.05
Munhall,Pa. P5 .....5.05
Pittsburgh J5 .....5.05
Warren,O. R2 .....5.05
Youngstown R2, U5 ....5.05

WIRE RODS

AlabamaCity,Ala. R2 ...6.40
Aliquippa,Pa. J5 .....6.40
Alton,Ill. L1 .....6.60
Bartonville,Ill. K4 ....6.50
Buffalo W12 .....6.40
Cleveland A7 .....6.40
Donora,Pa. A7 .....6.40
Fairfield,Ala. T2 .....6.40
Houston S5 .....6.65
IndianaHarbor,Ind. Y1 .6.40
Johnstown,Pa. B2 .....6.40
Joliet,Ill. A7 .....6.40
KansasCity,Mo. S5 ....6.65
Kokomo,Ind. C16 .....6.50
LosAngeles B3 .....7.20
Minnequa,Colo. C10 ....6.65
Monessen,Pa. P7 .....6.40
N.Tonawanda S47 .....6.40
Pittsburg,Calif. C11 ....7.20
Portsmouth,O. P12 ....6.40
Roebling,N.J. R5 .....6.50
S.Chicago,Ill. R2, W14..6.40
SparrowsPoint,Md. B2..6.50
Sterling,Ill.(1) N15 ....6.40
Sterling,Ill. N15 .....6.50
Struthers,O. Y1 .....6.40
Worcester,Mass. A7 ....6.70

STRUCTURALS

Carbon Steel Std. Shapes

AlabamaCity,Ala. R2 ...5.50
Aliquippa,Pa. J5 .....5.50
Atlanta A11 .....5.70
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa. B2 .....5.55
Birmingham C15 .....5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.30
Gary,Ind. U5 .....5.50
Geneva,Utah C11 .....5.50
Houston S5 .....5.60
Ind.Harbor,Ind. I-2, Y1.5.50
Johnstown,Pa. B2 .....5.55
Joliet,Ill. P22 .....5.50
KansasCity,Mo. S5 ....5.60
Lackawanna,N.Y. B2 ..5.55
LosAngeles B3 .....6.20
Minnequa,Colo. C10 ....5.80
Munhall,Pa. U5 .....5.50
Niles,Calif. P1 .....6.25
Phoenixville,Pa. P4 ....5.55
Portland,Oreg. O4 ....6.25
Seattle B3 .....6.25
S.Chicago,Ill. U5, W14..5.50
S.SanFrancisco B3 ....6.15
Sterling,Ill. N15 .....5.50
Struthers,O. Y1 .....5.50
Torrance,Calif. C11 ....6.20
Weirton,W.Va. W6 ....5.50

Wide Flange

Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.50
Fontana,Calif. K1 ....6.45
IndianaHarbor,Ind. I-2..5.50
Lackawanna,N.Y. B2 ..5.55
Munhall,Pa. U5 .....5.50
Phoenixville,Pa. P4 ....5.55
S.Chicago,Ill. U5 .....5.50
Sterling,Ill. N5 .....5.50
Weirton,W.Va. W6 ....5.50

Alloy Std. Shapes

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....6.90
Munhall,Pa. U5 .....6.80
S.Chicago,Ill. U5, W14 .6.80

H.S., L.A., Std. Shapes

Aliquippa,Pa. J5 .....8.05
Bessemer,Ala. T2 .....8.05
Bethlehem,Pa. B2 .....8.10
Clairton,Pa. U5 .....8.05
Fairfield,Ala. T2 .....8.05
Fontana,Calif. K1 ....8.85
Gary,Ind. U5 .....8.05
Geneva,Utah C11 .....8.05
Houston S5 .....8.15
Ind.Harbor,Ind. I-2, Y1 8.05
Jonhstown,Pa. B2 .....8.10
KansasCity,Mo. S5 ....8.15
Lackawanna,N.Y. B2 ...8.10
LosAngeles B3 .....8.75
Munhall,Pa. U5 .....8.05
Phoenixville,Pa. P4 ....8.10
Seattle B3 .....8.80
S.Chicago,Ill. U5, W14..8.05
S.SanFrancisco B3 ....8.70
Sterling,Ill. N15 .....7.75
Struthers,O. Y1 .....8.05

H.S., L.A., Wide Flange

Bethlehem,Pa. B2 .....8.10
Ind.Harbor,Ind. I-2 ....8.05
Lackawanna,N.Y. B2 ...8.10
Munhall,Pa. U5 .....8.05
S.Chicago,Ill. U5 .....8.05
Sterling,Ill. N15 .....7.75

PILING

BEARING PILES

Bethlehem,Pa. B2 .....5.55
Ind.Harbor,Ind. I-2 ....5.50
Lackawanna,N.Y. B2 ...5.55
Munhall,Pa. U5 .....5.50
S.Chicago,Ill. I-2, U5 ...5.50

STEEL SHEET PILING

Ind.Harbor,Ind. I-2 ....6.50
Lackawanna,N.Y. B2 ..6.50
Munhall,Pa. U5 .....6.50
S.Chicago,Ill. I-2, U5 ...6.50
Weirton,W.Va. W6 ....6.50

PLATES

PLATES, Carbon Steel

AlabamaCity,Ala. R2 ...5.30
Aliquipa,Pa. J5 .....5.30
Ashland,Ky(15) A10 ...5.30
Bessemer,Ala. T2 .....5.30
Clairton,Pa. U5 .....5.30
Claymont,Del. P4 .....5.30
Cleveland J5, R2 .....5.30
Coatesville,Pa. L7 .....5.30
Conshohocken,Pa. A3 ...5.30
Ecorse,Mich. G5 .....5.30
Fairfield,Ala. T2 .....5.30
Farrell,Pa. S3 .....5.30
Fontana,Calif.(30) K1 ..6.10
Gary,Ind. U5 .....5.30
Geneva,Utah C11 .....5.30
GraniteCity,Ill. G4 ....5.40
Houston S5 .....5.40
Ind.Harbor,Ind. I-2, Y1.5.30
Johnstown,Pa. B2 .....5.30
Lackawanna,N.Y. B2 ...5.30
Mansfield,O. E6 .....5.30
Minnequa,Colo. C10 ....6.15
Munhall,Pa. U5 .....5.30
Newport,Ky. A2 .....5.30
Pittsburgh J5 .....5.30
Riverdale,Ill. A1 .....5.30
Seattle B2 .....6.20
Sharon,Pa. S3 .....5.30
S.Chicago,Ill. U5, W14..5.30
SparrowsPoint,Md. B2 ..5.30
Sterling,Ill. N15 .....5.30
Steubenville,O. W10 ....5.30
Warren,O. R2 .....5.30
Youngstown U5, Y1 ....5.30
Youngstown(27) R2 ....5.30

PLATES, Carbon Abras. Resist.

Claymont,Del. P4 .....7.05
Fontana,Calif. K1 .....7.85
Geneva,Utah C11 .....7.05
Houston S5 .....7.15
Johnstown,Pa. B2 ....7.05
SparrowsPoint,Md. B2 ..7.05

PLATES, Wrought Iron

Economy,Pa. B14 ....14.10

PLATES, H.S., L.A.

Aliquippa,Pa. J5 .....7.95
Ashland,Ky. A10 .....7.95
Bessemer,Ala. T2 .....7.95
Clairton,Pa. U5 .....7.95
Claymont,Del. P4 .....7.95
Cleveland J5, R2 .....7.95
Coatesville,Pa. L7 .....7.95
Conshohocken,Pa. A3 ...7.95
Economy,Pa. B14 .....7.95
Ecorse,Mich. G5 .....7.96
Fairfield,Ala. T2 .....7.95
Farrell,Pa. S3 .....7.95
Fontana,Calif.(30) K1 ..8.75
Gary,Ind. U5 .....7.95
Geneva,Utah C11 .....7.95
Houston S5 .....8.05
Ind.Harbor,Ind. I-2, Y1 .7.95
Johnstown,Pa. B2 .....7.95
Munhall,Pa. U5 .....7.95
Pittsburgh J5 .....7.95
Seattle B3 .....8.85
Sharon,Pa. S3 .....7.95
S.Chicago,Ill. U5, W14..7.95
SparrowsPoint,Md. B2 ..7.95
Sterling,Ill. N15 .....7.625
Warren,O. R2 .....7.95
Youngstown U5, Y1 ....7.95

PLATES, Alloy

Claymont,Del. P4 .....7.50
Coatesville,Pa. L7 .....7.50
Economy,Pa. B14 .....7.50
Farrell,Pa. S3 .....7.50
Fontana,Calif. K1 .....8.30
Gary,Ind. U5 .....7.50
Houston S5 .....7.60
Ind.Harbor,Ind. Y1 ....7.50
Johnstown,Pa. B2 .....7.50
Lowellville,O. S3 .....7.50
Munhall,Pa. U5 .....7.50
Newport,Ky. A2 .....7.50
Pittsburgh J5 .....7.50
Seattle B3 .....8.40
Sharon,Pa. S3 .....7.50
S.Chicago,Ill. U5, W14..7.50
SparrowsPoint,Md. B2 ..7.50
Youngstown Y1 .....7.50

PLATES, Ingot Iron

Ashland c.l. (15) A10 ..5.55
Ashland l.c.l.(15) A10 ..6.05
Cleveland c.l. R22 .....6.05
Warren,O. R2 .....6.05

FLOOR PLATES

Cleveland J5 .....6.375
Claymont,Del. P4 ....6.375
Conshohocken,Pa. A3 ..6.375
Ind.Harbor,Ind. I-2 ...6.375
Munhall,Pa. U5 .....6.375
Pittsburgh J5 .....6.375
S.Chicago,Ill. U5 .....6.375

BARS

BARS, Hot-Rolled Carbon (Merchant Quality)

Ala.City,Ala.(9) R2 ...5.675
Aliquippa,Pa.(9) J5 ...5.675
Alton,Ill. L1 .....5.875
Atlanta(9) A11 .....5.875
Bessemer,Ala.(9) T2 ..5.675
Birmingham(9) C15 ....5.675
Buffalo(9) R2 .....5.675
Canton,O.(23) R2 .....6.15
Clairton,Pa.(9) U5 ....5.675
Cleveland(9) R2 .....5.675
Ecorse,Mich.(9) G5 ...5.675
Emeryville,Calif. J7 ...6.425
Fairfield,Ala.(9) T2 ...5.675
Fairless,Pa.(9) U5 ...5.825
Fontana,Calif.(9) K1 ..6.375
Gary,Ind.(9) U5 .....5.675
Houston(9) S5 .....5.925
Ind.Harbor(9) I-2, Y1..5.675
Johnstown,Pa.(9) B2 ..5.675
Joliet,Ill. P2 .....5.675
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
LosAngeles(9) B3 ....6.375
Massillon,O.(23) R2 ....6.15
Midland,Pa.(23) C18 ..6.025
Milton,Pa. M18 .....5.825
Minneque,Colo. C10 ...6.125
Niles,Calif P1 .....6.375
N.Tonawanda S47 ....5.675
Owensboro,Ky.(9) G8..6.025
Pittsburg,Calif.(9) C11.6.375
Pittsburgh(9) J5 .....5.675
Portland,Oreg. O4 ....6.425
Riverdale,Ill.(9) A1 ...5.675
Seattle(9) A24,B3,N15..6.425
S.Ch'c'go(9)R2,U5,W14 5.675
S.Duquesne,Pa.(9) U5..5.675
S.SanFran.,Calif.(9)B3 6.425
Sterling,Ill.(1)(9) N15..5.675
Sterling,Ill.(9) N15 ...5.775
Struthers,O.(9) Y1 ....5.675
Tonawanda,N.Y. B12 ...5.675
Torrance,Calif.(9) C11..6.375
Warren,O. C17 .....6.025
Youngstown(9) R2, U5.5.675

BARS, Hot-Rolled Alloy

Aliquippa,Pa. J5 ....6.725
Bethlehem,Pa. B2 ....6.725
Bridgeport,Conn. C32 ..6.80
Buffalo R2 .....6.725
Canton,O. R2, T7 ....6.725
Clairton,Pa. U5 .....6.725
Detroit S41 .....6.725
Economy,Pa. B14 ....6.725
Ecorse,Mich. G5 .....6.725
Farrell,Pa. S3 .....6.725
Fontana,Calif K1 ....7.775
Gary,Ind. U5 .....6.725
Houston S5 .....6.975
Ind.Harbor,Ind. I-2, Y1 6.725
Johnstown,Pa. B2 ....6.725
KansasCity,Mo. S5 ....6.975
Lackawanna,N.Y. B2 ..6.725
LosAngeles B3 .....7.775
Lowellville,O. S3 .....6.725
Massillon,O. R2 .....6.725
Midland,Pa. C18 .....6.725
N.Tonawanda S47 ....6.725
Owensboro,Ky. G8 ....6.725
Pittsburgh J5 .....6.725
Seattle(6) B3 .....7.825
Sharon,Pa. S3 .....6.725
S.Chicago R2, U5, W14 6.725
S.Duquesne,Pa. U5 ....6.725
Struthers,O. Y1 .....6.725
Warren,O. C17 .....6.725
Youngstown U5 .....6.725

BARS & SMALL SHAPES, H.R. High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....8.30
Bessemer,Ala. T2 .....8.30
Bethlehem,Pa. B2 .....8.30
Clairton,Pa. U5 .....8.30
Cleveland R2 .....8.30
Ecorse,Mich. G5 .....8.30
Fairfield,Ala. T2 .....8.30
Fontana,Calif. K1 .....9.00
Gary,Ind. U5 .....8.30
Houston S5 .....8.55
Ind.Harbor,Ind. Y1 ....8.30
Johnstown,Pa. B2 .....8.30
KansasCity,Mo. S5 ....8.55
Lackawanna,N.Y. B2 ..8.30
LosAngeles B3 .....9.00
Pittsburgh J5 .....8.30
Seattle B3 .....9.06
S.Chicago,Ill. R2, W14..8.30
S.Duquesne,Pa. U5 ....8.30
S.SanFrancisco B3 ....9.05
Sterling,Ill. N15 .....7.925
Struthers,O. Y1 .....8.30
Youngstown U5 .....8.30

BAR SIZE ANGLES; H.R. Carbon

Bethlehem,Pa.(9) B2 ..5.825
Houston(9) S5 .....5.925
KansasCity,Mo.(9) S5..5.925
Lackawanna(9) B2 ....5.675
Sterling,Ill. N15 .....5.775
Sterling,Ill.(1) N15 ....5.675
Tonawanda,N.Y. B12 ..5.675

BAR SIZE ANGLES; S. SHAPES

Aliquippa,Pa. J5 .....5.675
Atlanta A11 .....5.875
Joliet,Ill. P22 .....5.675
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 ....6.425
SanFrancisco S7 .....6.52
Seattle B3 .....6.425

BAR SIZE ANGLES; S. SHAPES Wrought Iron

Economy,Pa. B14 ....16.45

BAR SHAPES, Hot-Rolled Alloy

Aliquippa,Pa. J5 .....6.80
Clairton,Pa. U5 .....6.80
Gary,Ind. U5 .....6.80
Houston S5 .....7.05
KansasCity,Mo. S5 ....7.05
Pittsburgh J5 .....6.80
Youngstown U5 .....6.80

BARS, C.F. Leaded (Including leaded extra) Carbon

LosAngeles P2, S30 ..11.75*

Alloy

Ambridge,Pa. W18 ..10.175
BeaverFalls,Pa. M12..10.175
Camden,N.J. P13 ....10.35
Chicago W18 .....10.175
Elyria,O. W8 .....10.175
Monaca,Pa. S17 ....10.175
Newark,N.J. W18 ....10.35
SpringCity,Pa. K3 ....10.35

*Grade A; add 0.5c for Grade B.

BARS, Cold-Finished Carbon

Ambridge,Pa. W18 ....7.65
BeaverFalls,Pa. M12,R2 7.65
Birmingham C15 .....8.10
Buffalo B5 .....7.70
Camden,N.J. P13 .....8.10
Carnegie,Pa. C12 .....7.65
Chicago W18 .....7.65
Cleveland A7, C20 ....7.65
Detroit B5, H5, P17 ...7.85
Detroit S41 .....7.65
Donora,Pa. A7 .....7.65
Elyria,O. W8 .....7.65
FranklinPark,Ill. N5 ...7.65
Gary,Ind. R2 .....7.65
GreenBay,Wis. F7 ....7.65
Hammond,Ind. J5, L2 ..7.65
Hartford,Conn. R2 ...8.15
Harvey,Ill. B5 .....7.65
LosAngeles(49) S30 ...9.10
LosAngeles(49) P2, R2..9.10
Mansfield,Mass. B5 ....8.20
Massillon,O. R2, R8 ....7.65
Midland,Pa. C18 .....7.65
Monaca,Pa. S17 .....7.16
Newark,N.J. W18 .....8.10
NewCastle,Pa.(17) B4 ..7.65
Pittsburgh J5 .....7.65
Plymouth,Mich. P5 ....7.90
Putnam,Conn. W18 ....8.20
Readville,Mass. C14 ....8.20
Seattle(49) S30 .....9.10
S.Chicago,Ill. W14 ....7.65
SpringCity,Pa. K3 ....8.10
Struthers,O. Y1 .....7.65
Warren,O. C17 .....7.65
Waukegan,Ill. A7 .....7.65
Willimantic,Conn. J5 ...8.15
Youngstown F3, Y1 ....7.65

BARS, Cold-Finished Alloy (Turned and Ground)

Cumberland,Md.(5) C19 6.55

BARS, Cold-Finished Alloy

Ambridge,Pa. W18 ....9.025
BeaverFalls,Pa. M12,R2 9.025
Bethlehem,Pa. B2 ....9.025
Bridgeport,Conn. C32 ..9.175
Buffalo B5 .....9.025
Camden,N.J. P13 .....9.20
Canton,O. T7 .....9.025
Carnegie,Pa. C12 .....9.025
Chicago W18 .....9.025
Cleveland A7, C20 ....9.025
Detroit B5, P17 .....9.225
Detroit H5, S41 .....9.025
Donora,Pa. A7 .....9.025
Elyria,O. W8 .....9.025
FranklinPark,Ill. N5 ..9.025
Gary,Ind. R2 .....9.025
GreenBay,Wis. F7 ....9.025

Hammond,Ind. J5, L2..9.025
Hartford,Conn. R2 ....9.325
Harvey,Ill. R5 .....9.025
Lackawanna,N.Y. B3 ..9.025
LosAngeles P2, S30 ...11.00
Mansfield,Mass. B5 ...9.325
Massillon,O. R2, R8 ...9.025
Midland,Pa. C18 .....9.025
Monaca,Pa. S17 .....9.025
Newark,N.J. W18 .....9.20
N.Tonawanda S47 ....9.025
Plymouth,Mich. P5 ...9.225
S.Chicago,Ill. W14 ....9.025
SpringCity,Pa. K3 .....9.20
Struthers,O. Y1 .....9.025
Warren,O. C17 .....9.025
Waukegan,Ill. A7 .....9.025
Willimantic,Conn. J5 ..9.325
Worcester,Mass. A7 ...9.325
Youngstown F3, Y1 ...9.025

BARS, Reinforcing, Billet (To Fabricators)

Atlanta A11 .....5.00
Birmingham C15 .....5.25
Ecorse,Mich. G5 .....5.675
Emeryville,Calif. J7 ...6.425
Fontana,Calif. K1 ....6.375
Ind.Harbor,Ind. Y1 ....5.675
Johnstown,Pa. B2 ....5.675
Joliet,Ill. P22 .....5.675
Kokomo,Ind. C16 .....5.775
Lackawanna,N.Y. B2 ..5.675
LosAngeles B3 .....6.375
Madison,Ill. L1 .....5.475
Milton,Pa. M18 .....5.825
Minnequa,Colo. C10 ...6.125
Niles,Calif. P1 .....6.375
Pittsburgh J5 .....5.675
Portland,Oreg. O4 .....6.425
Seattle A24, B3, N14 ..6.425
S.Chicago,Ill. W14 ....5.675
S.SanFrancisco B3 ....6.425
SparrowsPoint,Md. B2..5.675
Steelton,Pa. B2 .....5.675
Sterling,Ill. (1) N15 ..5.675
Sterling,Ill. N15 .....5.775
Struthers,O. Y1 .....5.675
Tonawanda,N.Y. B12 ...6.10

BARS, Reinforcing, Billet (Fabricated, to Consumers)

Baltimore B2 .....7.42
Boston B2, U8 .....8.15
Chicago U8 .....7.41
Cleveland U8 .....7.39
Johnstown,Pa. B2 .....7.33
Lackawanna,N.Y. B2 ..7.35
Marion,O. P11 .....6.70
Newark,N.J. U8 .....7.80
Philadelphia U8 .....7.63
Pittsburgh J5, U8 ....7.35
Seattle A24, B3, N14 ...7.95
SparrowsPoint,Md. B2 ..7.33
St.Paul U8 .....8.17

BARS, Wrought Iron

Economy,Pa.(S.R.)B14 16.10
Economy,Pa.(D.R.)B14 20.50
Econ.(DirectRolled)B14 13.55
Economy(Staybolt)B14 20.50
McK.Rks.(S.R.) L5 ...16.10
McK.Rks(D.R.) L5 ...20.50
McK.Rks.(Dir.Rolled)L513.55

BARS, Rail Steel

ChicagoHts.(3) C2, I-2 5.575
ChicagoHts.(4)(44) I-2 5.675
ChicagoHts.(4) C2 ....5.675
Franklin,Pa.(3) F5 ...5.575
Franklin,Pa.(4) F5 ...5.675
JerseyShore,Pa.(3) J8 ..5.55
Marion,O.(3) P11 ....5.575
Tonawanda(3) B12 ....5.575
Tonawanda(4) B12 ....6.10

SHEETS

SHEETS, Hot-Rolled Steel (18 Gage and Heavier)

AlabamaCity,Ala. R2 ...5.10
Allenport,Pa. P7 .....5.10
Aliquippa,Pa. J5 .....5.10
Ashland,Ky.(8) A10 ....5.10
Cleveland J5, R2 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit(8) M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Fairless,Pa. U5 .....5.15
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Geneva,Utah C11 .....5.20
GraniteCity,Ill.(8) G4 ..5.20
Ind.Harbor,Ind. I-2, Y1 5.10
Irvin,Pa. U5 .....5.10
Lackawanna,N.Y. B2 ...5.10
Mansfield,O. E6 .....5.10
Munhall,Pa. U5 .....5.10
Newport,Ky. A2 .....5.10
Niles,O. M21, S3 .....5.10
Pittsburg,Calif. C11 ....5.80
Pittsburgh J5 .....5.10
Portsmouth,O. P12 ....5.10
Riverdale,Ill. A1 .....5.10
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. U5, W14..5.10
SparowsPoint,Md. B2 ..5.10
Steubenville,O. W10 ....5.10
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ....5.10

SHEETS, H.R. (19 Ga. & Lighter)

Niles,O. M21, S3 .....6.275

SHEETS, H.R. Alloy

Gary,Ind. U5 .....8.40
Ind.Harbor,Ind. Y1 .....8.40
Irvin,Pa. U5 .....8.40
Munhall,Pa. U5 .....8.40
Newport,Ky. A2 .....8.40
Youngstown U5, Y1 ....8.40

SHEETS, H.R. (14 Ga. & Heavier) High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....7.525
Ashland,Ky. A10 .....7.525
Cleveland J5, R2 .....7.525
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.525
Fairfield,Ala. T2 .....7.525
Fairless,Pa. U5 .....7.575
Farrell,Pa. S3 .....7.525
Fontana,Calif. K1 .....8.40
Gary,Ind. U5 .....7.525
Ind.Harbor,Ind. I-2, Y1 7.525
Irvin,Pa. U5 .....7.525
Lackawanna(35) B2 ...7.525
Munhall,Pa. U5 .....7.525
Niles,O. S3 .....7.525
Pittsburgh J5 .....7.525
S.Chicago,Ill. U5, W14 7.525
Sharon,Pa. S3 .....7.525
SparrowsPoint(36) B2..7.525
Warren,O. R2 .....7.525
Weirton,W.Va. W6 ....7.525
Youngstown U5, Y1 ...7.525

SHEETS, Hot-Rolled Ingot Iron (18 Gage and Heavier)

Ashland,Ky.(8) A10 ....5.35
Cleveland R2 .....5.875
Warren,O. R2 .....5.875

SHEETS, Cold-Rolled Ingot Iron

Cleveland R2 .....7.05
Middletown,O. A10 ....6.775
Warren,O. R2 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

AlabamaCity,Ala. R2 ..6.275
Aliquippa,Pa. J5 .....6.275
Allenport,Pa. P7 ....6.275
Cleveland J5, R2 .....6.275
Conshohocken,Pa. A3 ..6.325
Detroit M1 .....6.275
Ecorse,Mich. G5 .....6.275
Fairfield,Ala. T2 .....6.275
Fairless,Pa. U5 .....6.325
Follansbee,W.Va. F4 ..6.275
Fontana,Calif. K1 .....7.40
Gary,Ind. U5 .....6.275
GraniteCity,Ill. G4 ....6.375
Ind.Harbor,Ind. I-2, Y1 6.275
Irvin,Pa. U5 .....6.275
Lackawanna,N.Y. B2 ..6.275
Mansfield,O. E6 .....6.275
Middletown,O. A10 ....6.275
Newport,Ky. A2 .....6.275
Pittsburg,Calif. C11 ...7.225
Pittsburgh J5 .....6.275
Portsmouth,O. P12 ....6.275
SparrowsPoint,Md. B2..6.275
Steubenville,O. W10 ...6.275
Warren,O. R2 .....6.275
Weirton,W.Va. W6 ....6.275
Yorkville,O. W10 .....6.275
Youngstown Y1 .....6.275

SHEETS, Cold-Rolled, High-Strength, Low-Alloy

Aliquippa,Pa. J5 .....9.275
Cleveland J5, R2 .....9.275
Ecorse,Mich. G5 .....9.275
Fairless,Pa. U5 .....9.325
Fontana,Calif. K1 .....10.40
Gary,Ind. U5 .....9.275
Ind.Harbor,Ind. I-2, Y1 9.275
Lackawanna(38) B2 ..9.275
Pittsburgh J5 .....9.275
SparrowsPoint(33) B2..9.275
Warren,O. R2 .....9.275
Weirton,W.Va. W6 ....9.275
Youngstown Y1 .....9.275

SHEETS, Culvert

	Cu Steel	Cu Fe
Ala.City,Ala. R2	7.125	....
Ashland,Ky. A10	7.125	7.375
Canton,O. R2	7.125	....
Fairfield,Ala. T2	7.125	7.375
Gary,Ind. U5	7.125	7.375
GraniteCity,Ill.G4	7.225	....
Ind.Harbor I-2	7.125	7.375
Irvin,Pa. U5	7.125	7.375
Kokomo,Ind. C16	7.225	....
MartinsFry. W10	7.125	7.375
Pitts.,Calif. C11	7.875	....
Pittsburgh J5	7.125	....
SparrowsPt. B2	7.225	....
Weirton W6	7.125	....

SHEETS, Culvert—Pure Iron

Ind.Harbor,Ind. I-2 ....7.375

SHEETS, Enameling

Ashland,Ky. A10 .....6.775
Cleveland R2 .....6.775
Fairfield,Ala. T2 .....6.775
Gary,Ind. U5 .....6.775
Ind.Harbor,Ind. I-2, Y1 6.775
Irvin,Pa. U5 .....6.775
Middletown,O. A10 ....6.775
Niles,O. M21, S3 .....6.775
SparrowsPoint,Md. B2..6.775
Youngstown Y1 .....6.775

BLUED STOCK, 29 Gage

Dover,O. E6 .....8.70
Ind.Harbor,Ind. I-2 ....8.70
Mansfield,O. E6 .....8.70
Warren,O. R2 .....8.70
Yorkville,O. W10 .....8.70

SHEETS, Long Terne, Steel

Follansbee,W.Va. W10 7.225
Gary,Ind. U5 .....7.225
Mansfield,O. E6 .....7.225
Middletown,O. A10 ....7.225
Niles,O. M21, S3 .....7.225
Warren,O. R2 .....7.225

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10 ....7.625

SHEETS, Aluminum Coated

Butler,Pa. A10 (type 1) 9.525
Butler,Pa. A10 (type 2) 9.625
Irvin,Pa. U5 (type 1) 9.525

SHEETS, Well Casing

Fontana,Calif. K1 ....7.325
Geneva,Utah C11 .....6.80

SHEETS, Galvanized High-Strength, Low Alloy

Irvin,Pa. U5 .....10.125
Pittsburgh J5 .....10.125
SparrowsPt.(39) B2 ..10.025

SHEETS, Galvannealed Steel

Canton,O. R2 .....7.175
Irvin,Pa. U5 .....7.175

SHEETS, Galvanized Ingot Iron (Hot-Dipped Continuous)

Ashland,Ky. A10 .....7.125
Middletown,O. A10 ....7.125

SHEETS, Electrogalvanized

Canfield,O. C3 .....7.50
Cleveland (28) R2 .....7.65
Niles,O. (28) R2 .....7.65
Weirton,W.Va. W6 .....7.50

SHEETS, Galvanized Steel Hot-Dipped§

AlabamaCity,Ala. R2 ..6.875‡
Ashland,Ky. A10 .....6.875‡
Canton,O. R2 .....6.875‡
Dover,O. E6 .....6.875†
Fairfield,Ala. T2 .....6.875†
Gary,Ind. U5 .....6.875†
GraniteCity,Ill. G4 ...6.975*
Ind.H'rb'r,Ind. I-2, Y1 6.875†
Irvin,Pa. U5 .....6.875†
Kokomo,Ind. C16 ....6.975‡
MartinsFerry,O. W10 ..6.875*
Middletown,O. A10 ....6.875†
Pittsburg,Calif. C11 ...7.625*
Pittsburgh J5 .....6.875†
SparrowsPt.,Md. B2 ..6.875†
Warren,O. R2 .....6.875†
Weirton,W.Va. W6 ....6.875*

*Continuous and noncontinuous. †Continuous. ‡Noncontinuous. §For minimum spangled add 0.15c.

Key to Producers

A1 Acme Steel Co.
A2 Acme-Newport Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A5 Alloy Metal Wire Div., H. K. Porter Co. Inc.
A6 American Shim Steel Co.
A7 American Steel & Wire Div., U. S. Steel Corp.
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A25 Algoma Steel Corp. Ltd.

B1 Babcock & Wilcox
B2 Bethlehem Steel Co.
B3 Bethlehem Steel Co., Pacific Coast Div.
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B8 Braeburn Alloy Steel
B9 Brainard Steel Div., Sharon Steel Corp.
B10 E. & G. Brooke, Wickwire Spencer Steel Div., Colo. Fuel & Iron
B12 Buffalo Steel Corp.
B14 A. M. Byers Co.
B15 J. Bishop & Co.

C1 Calstrip Steel Corp.
C2 Calumet Steel Div., Borg-Warner Corp.
C3 Canfield Steel Co.
C4 Carpenter Steel Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia-Geneva Steel
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C15 Connors Steel Div., H. K. Porter Co., Inc.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire Div., Hoover Ball & Bearing
C23 Charter Wire Inc.
C24 G. O. Carlson Inc.
C32 Carpenter Steel of N.Eng.

D2 Detroit Steel Corp.
D4 Disston Div., H. K. Porter Co. Inc.
D6 Driver-Harris Co.
D7 Dickson Weatherproof Nail Co.
D8 Damascus Tube Co.
D9 Wilbur B. Driver Co.

E2 Eastern Stainless Steel
E6 Empire-Reeves Steel
E10 Enamel Prod. & Plating

F2 Firth Sterling Inc.
F3 Fitzsimons Steel Co.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
F8 Ft. Wayne Metals Inc.

G4 Granite City Steel Co.
G5 Great Lakes Steel Corp.
G6 Greer Steel Co.
G8 Green River Steel Corp.

H1 Hanna Furnace Corp.
H5 Hercules Drawn Steel
H7 Helical Tube Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.
I-6 Ivins Steel Tube Works
I-7 Indiana Steel & Wire Co.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Joslyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.
J10 Jay Steel Corp.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire
L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Steel Co.
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.
L8 Leschen Wire Rope Div., H. K. Porter Co. Inc.

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M6 Mercer Pipe Div., Sawhill Tubular Products
M8 Mid-States Steel & Wire
M12 Moltrup Steel Products
M14 McInnes Steel Co.
M16 Md. Fine & Specialty Wire Co. Inc.
M17 Metal Forming Corp.
M18 Milton Steel Div., Merritt-Chapman&Scott
M21 Mallory-Sharon Metals Corp.
M22 Mill Strip Products Co.
M23 Mill Strip Products Co. of Pennsylvania

N1 National Standard Co.
N2 National Supply, Armco Steel Corp.
N3 National Tube Div., U. S. Steel Corp.
N5 Nelsen Steel & Wire Co.
N6 New England High Carbon Wire Co.
N8 Newman-Crosby Steel
N14 Northwest. Steel Rolling Mills Inc.
N15 Northwestern S.&W. Co.
N17 National Steel Corp.
N20 Neville Ferro Alloy Co.

O1 Ohio Ferro-Alloys Corp.
O4 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Steel Corp.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke & Chem.
P7 Pittsburgh Steel Co.
P11 Pollak Steel Co.
P12 Portsmouth Div., Detroit Steel Corp.
P13 Precision Drawn Steel
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., American Chain & Cable
P17 Plymouth Steel Corp.
P19 Pitts. Rolling Mills
P20 Prod. Steel Strip Corp.
P22 Phoenix Mfg. Co.
P25 Phil. Steel & Wire Corp.

R2 Republic Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R8 Reliance Div., Eaton Mfg.
R9 Rome Mfg. Co.
R10 Rodney Metals Inc.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S4 Sharon Tube Co.
S5 Sheffield Div. Armco Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S12 Spencer Wire Corp.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S17 Superior Drawn Steel Co.
S18 Superior Steel Div., Copperweld Steel Co.
S19 Sweet's Steel Co.
S20 Southern States Steel
S23 Superior Tube Co.
S25 Stainless Welded Prod.
S26 Specialty Wire Co. Inc.
S30 Sierra Drawn Steel Div., Bliss & Laughlin Inc.
S31 Sawhill Tubular Products
S40 Seneca Steel Service
S41 Stainless & Strip Div., J & L Steel Corp.
S42 Southern Elec. Steel Co.
S43 Seymour Mfg. Co.
S44 Screw & Bolt Corp. of America
S45 Somers Brass Co.
S46 Steel Co. of Canada
S47 Seaway Steel Div., Roblin-Seaway Industries

T2 Tenn. Coal & Iron Div. U. S. Steel Corp.
T3 Tenn. Products & Chemical
T4 Texas Steel Co.
T5 Thomas Strip Div., Pittsburgh Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div., Am. Rad. & Stan. San.
T13 Tube Methods Inc.
T19 Techalloy Co. Inc.

U3 Union Wire Rope, Armco Steel Corp.
U4 Universal-Cyclops Steel
U5 U. S. Steel Corp.
U6 U. S. Pipe & Foundry
U7 Ulbrich Stainless Steels
U8 U. S. Steel Supply Div., U. S. Steel Corp.
U11 Union Carbide Metals Co.
U13 Union Steel Corp.

V2 Vanadium-Alloy Steel
V3 Vulcan Kidd Steel Div., H. K. Porter Co.

W1 Wallace Barnes Steel Div., Associated Spring
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Weirton Steel Div., National Steel Corp.
W8 Western Cold Drawn Steel Div., Standard Screw Co.
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div., International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

STRIP

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2 ...5.10
Allenport,Pa. P7 .....5.10
Alton,Ill. L1 .....5.30
Ashland,Ky.(8) A10 ....5.10
Atlanta A11 .....5.10
Bessemer,Ala. T2 .....5.10
Birmingham C15 .....5.10
Conshohocken,Pa. A3 ...5.15
Detroit M1 .....5.10
Ecorse,Mich. G5 .....5.10
Fairfield,Ala. T2 .....5.10
Farrell,Pa. S3 .....5.10
Fontana,Calif. K1 .....5.825
Gary,Ind. U5 .....5.10
Ind.Harbor,Ind. I-2, Y1.5.10
Johnstown,Pa.(25) B2 ...5.10
Lackawanna,N.Y.(25) B2.5.10
LosAngeles(25) B3 ....5.85
LosAngeles C1 .....8.60
Minnequa,Colo. C10 ....6.20
Riverdale,Ill. A1 .....5.10
SanFrancisco S7 .....6.60
Seattle(25) B3 .....6.10
Seattle N14 .....6.60
Sharon,Pa. S3 .....5.10
S.Chicago,Ill. W14 ....5.10
S.SanFrancisco(25) B3..5.85
SparrowsPoint,Md. B2 ..5.10
Torrance,Calif. C11 ....5.85
Warren,O. R2 .....5.10
Weirton,W.Va. W6 ....5.10
Youngstown U5, Y1 ...5.10

STRIP, Hot-Rolled Alloy

Carnegie,Pa. S18 .....8.40
Farrell Pa. S3 .....8.40
Gary,Ind. U5 .....8.40
Houston S5 .....8.65
Ind.Harbor,Ind. Y1 ....8.40
KansasCity,Mo. S5 ....8.65
LosAngeles B3 .....9.60
Lowellville,O. S3 .....8.40
Newport,Ky. A2 .....8.40
Sharon,Pa. A2, S3 ....8.40
S.Chicago,Ill. W14 ....8.40
Youngstown U5, Y1 ...8.40

STRIP, Hot-Rolled High-Strength, Low-Alloy

Ashland,Ky. A10 ....7.575
Bessemer,Ala. T2 ....7.375
Conshohocken,Pa. A3 ..7.575
Ecorse,Mich. G5 .....7.575
Fairfield,Ala. T2 .....7.575
Farrell,Pa. S3 .....7.575
Gary,Ind. U5 .....7.575
Ind.Harbor,Ind. I-2,Y1.7.575
Lackawanna,N.Y. B2 ..7.575
LosAngeles(25) B3 ...8.325
Seattle(25) B3 .....8.375
Sharon,Pa. S3 .....7.575
S.Chicago,Ill. W14 ....7.575
S.SanFrancisco(25) B3.8.325
SparrowsPoint,Md. B2 ..7.575
Warren,O. R2 .....7.575
Weirton,W.Va. W6 ....7.575
Youngstown U5, Y1 ...7.575

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ....5.35
Warren,O. R2 .....5.875

STRIP, Cold-Rolled Carbon

Anderson,Ind. G6 ....7.425
Baltimore T6 .....7.425
Boston T6 .....7.975
Buffalo S40 .....7.425
Cleveland A7 .....7.425
Dearborn,Mich. S3 ....7.425
Detroit D2, M1, P20 ..7.425
Dover,O. G6 .....7.425
Evanston,Ill. M22 ....7.425
Farrell,Pa. S3 .....7.425
Follansbee,W.Va. W10.7.425
Fontana,Calif. K1 .....9.20
FranklinPark,Ill. T6 ..7.425
Ind.Harbor,Ind. Y1 ...7.425
Indianapolis S41 .....7.575
LosAngeles C1, S41 ....9.30
McKeesport,Pa. E10 ...7.525
NewBedford,Mass. R10 7.875
NewBritain,Conn. S15 .7.875
NewCastle,Pa. B4, M23.7.425
NewHaven,Conn. D2 ..7.875
NewKensington,Pa. A6.7.425
Pawtucket,R.I. R3, N8.7.975
Philadelphia P24 ....7.875
Riverdale,Ill. A1 .....7.425
Rome,N.Y.(32) R6 ....7.425
Sharon,Pa. S3 .....7.425
Trenton,N.J.(31) R5 ..8.875
Warren,O. R2, T5 ....7.425
Worcester,Mass. A7 ...7.975
Youngstown S41, Y1 ...7.425

STRIP, Cold-Rolled Alloy

Boston T6 .....15.90
Carnegie,Pa. S18 .....15.55
Cleveland A7 .....15.55
Dover,O. G6 .....15.55
Farrell,Pa. S3 .....15.55
FranklinPark,Ill. T6 ..15.55
Harrison,N.J. S18 .....15.55
Indianapolis S41 .....15.70
LosAngeles S41 .....17.75
Lowellville,O. S3 .....15.55
Pawtucket,R.I. S8 ...15.90
Riverdale,Ill. A1 .....15.55
Sharon,Pa. S3 .....15.55
Worcester,Mass. A7 ...15.85
Youngstown S41 .....15.55

STRIP, Cold-Rolled High-Strength, Low-Alloy

Cleveland A7 .....10.80
Dearborn,Mich. S3 ....10.80
Dover,O. G6 .....10.80
Farrell,Pa. S3 .....10.80
Ind.Harbor,Ind. Y1 ...10.80
Sharon,Pa. S3 .....10.80
Warren,O. R2 .....10.80
Weirton,W.Va. W6 ...10.80
Youngstown Y1 .....10.80

STRIP, Galvanized (Continuous)

Farrell,Pa. S3 .....7.50
Sharon,Pa. S3 .....7.50

STRIP, C. R., Electrogalvanized

Cleveland A7 .....7.425*
Dover,O. G6 .....7.425*
Evanston,Ill. M22 ...7.525*
McKeesport,Pa. E10 ..7.50*
NewCastle,Pa. M23 ...7.425*
Riverdale,Ill. A1 .....7.425*
Warren,O. B9, S3, T5.7.425*
Worcester,Mass. A7 ..7.975
Youngstown S41 .....7.425*

*Plus galvanizing extras.

STRIP, Cold-Rolled Ingot Iron

Warren,O. R2 .....8.175

TIGHT COOPERAGE HOOP

Atlanta A11 .....5.825
Farrell,Pa. S3 .....5.525
Riverdale,Ill. A1 .....5.675
Sharon,Pa. S3 .....5.525
Youngstown U5 .....5.525

STRIP, Cold-Finished Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Anderson,Ind. G6	8.10	....	....	....	....
Baltimore T6	9.50	10.70	12.90	15.90	18.85
Boston T6	9.50	10.70	12.90	15.90	18.85
Bristol,Conn. W1	....	10.70	12.90	16.10	19.30
Carnegie,Pa. S18	8.95	10.40	12.60	15.60	....
Cleveland A7	8.95	10.40	12.60	15.60	18.55
Dearborn,Mich. S3	9.05	10.50	12.70	....	....
Detroit D2	9.05	10.50	12.70	15.70	....
Dover,O. G6	8.95	10.40	12.60	15.60	18.55
Evanston,Ill. M22	9.05	10.40	12.60	15.60	....
Farrell,Pa. S3	8.95	10.40	12.60	15.60	18.55
Fostoria,O. S1	10.05	10.40	12.60	15.60	....
FranklinPark,Ill. T6	9.05	10.40	12.60	15.60	18.55
Harrison,N.J. C18	....	....	12.90	16.10	19.30
Indianapolis S41	9.10	10.55	12.60	15.60	18.55
LosAngeles C1	11.15	12.60	14.80	17.80	....
LosAngeles S41	11.15	12.60	14.80	....	....
NewBritain,Conn. S15	9.40	10.70	12.90	15.90	18.85
NewCastle,Pa. B4, M23	8.95	10.40	12.60	15.60	....
NewHaven,Conn. D2	9.40	10.70	12.90	15.90	....
NewKensington,Pa. A6	8.95	10.40	12.60	15.60	....
NewYork W3	....	10.70	12.90	16.10	19.30
Pawtucket,R.I. N8	9.50	10.70	12.90	15.90	18.85
Riverdale,Ill. A1	9.05	10.40	12.60	15.60	18.55
Rome,N.Y. R6	8.95	10.40	12.60	15.60	18.55
Sharon,Pa. S3	8.95	10.40	12.60	15.60	18.55
Trenton,N.J. R5	....	10.70	12.90	15.90	18.85
Warren,O. T5	8.95	10.40	12.60	15.60	18.55
Worcester,Mass. A7, T6	9.50	10.70	12.90	15.90	18.85
Youngstown S41	8.95	10.40	12.60	15.60	18.55

Spring Steel (Tempered)	Up to 0.80C	0.81-1.05C	1.06-1.35C
Bristol,Conn. W1	18.85	22.95	27.80
Buffalo W12	18.85	....	....
Fostoria,O. S1	19.05	22.15	....
FranklinPark,Ill. T6	19.20	23.30	28.15
Harrison,N.J. C18	18.85	22.95	27.80
NewYork W3	18.85	22.95	27.80
Palmer,Mass. W12	18.85	....	....
Trenton,N.J. R5	18.85	22.95	27.80
Worcester,Mass. A7, T6	18.85	22.95	27.80
Youngstown S41	19.20	23.30	28.15

TIN MILL PRODUCTS

ELECTROLYTIC THIN TIN PLATE (¼ lb coating in coils)

	Basis Weight 45 lb	50 lb	55 lb	60 lb
Fairfield,Ala. T2	$6.10	$6.25	$6.40	$6.55
Fairless,Pa. U5	6.10	6.25	6.40	6.55
Gary,Ind. U5	6.10	6.25	6.40	6.55
IndianaHarbor,Ind. I-2	6.10	6.25	6.40	6.55
Irwin,Pa. U5	6.10	6.25	6.40	6.55
SparrowsPoint,Md. B2	6.10	6.25	6.40	6.55
Weirton,W.Va. W6	6.10	6.25	6.40	6.55

TIN PLATE, Electrolytic 0.25 lb (100 lb basis wt) Coating

Aliquippa,Pa. J5 .....$9.10
Fairfield,Ala. T2 .....9.10
Fairless,Pa. U5 .....9.10
Fontana,Calif. K1 .....9.75
Gary,Ind. U5 .....9.10
GraniteCity,Ill. G4 ....9.20
Ind.Harb.,Ind. I-2, Y1 ..9.10
Irvin,Pa. U5 .....9.10
Niles,O. R2 .....9.10
Pittsburg,Calif. C11 ...9.75
SparrowsPt.,Md. B2 ...9.10
Weirton,W.Va. W6 ....9.10
Yorkville,O. W10 .....9.10

BLACK PLATE (Base Box)

Aliquippa,Pa. J5 .....$8.20
Fairfield,Ala. T2 .....8.20
Fairless,Pa. U5 .....8.20
Fontana,Calif. K1 .....8.85
Gary,Ind. U5 .....8.20
GraniteCity,Ill. G4 ....8.30
Ind.Harbor,Ind. I-2, Y1 8.20
Irvin,Pa. U5 .....8.20
Niles,O. R2 .....8.20
Pittsburg,Calif. C11 ....8.85
SparrowsPoint,Md. B2 ..8.20
Weirton,W.Va. W6 ....8.20
Yorkville,O. W10 .....8.20

ELECTRO. TIN-COATED SHEET (20-27 gage; per 100 lb)

IndianaHarb.,Ind. Y1 ..$7.90

(21-27 gage; per 100 lb)

Aliquippa,Pa. J5 .....$7.90
Niles,O. R2 .....7.90

TIN PLATE, HOT DIPPED COMMON COKE 1.25 lb 1.50 lb

Aliquippa,Pa. J5 $10.40$10.65
Fairfield,Ala. T2 10.40 10.65
Fairless,Pa. U5 . 10.40 10.65
Fontana,Calif. K1 11.05 11.30
Gary,Ind. U5 ... 10.40 10.65
Irvin,Pa. U5 ... 10.40 10.65
Pitts.,Calif. C11. 11.05 11.30
Sp.Pt.,Md. B2 .. 10.40 10.65
Weirton,W.Va.W6 10.40 10.65
Yorkville,O. W10 10.40 10.65

HOLLOWARE ENAMELING (Black plate) (29 Gage)

Aliquippa,Pa. J5 .....7.85
Gary,Ind. U5 .....7.85
GraniteCity,Ill. G4 ....7.95
Ind.Harbor,Ind. Y1 ....7.85
Irvin,Pa. U5 .....7.85
Yorkville,O. W10 .....7.85

SILICON STEEL

C.R. COILS & CUT LENGTHS (22 Ga.)

Fully Processed (Semiprocessed ½c lower)	Field	Armature	Electric	Motor	Dynamo
BeechBottom,W.Va. W10	....	11.70	12.40	13.35	14.65
Brackenridge,Pa. A4	....	....	12.40	13.55	14.65
GraniteCity,Ill. G4	....	9.975*	11.30*	12.00*	13.15*	....
IndianaHarbor,Ind. I-2	...	9.875*	11.20*	11.90*	13.05*	....
Mansfield,O. E6	.....	9.875*	11.70	12.40	13.55	14.65
Newport,Ky. A2	.....	9.875	11.70*	12.40*	13.55*	14.65*
Niles,O. M21	.....	9.875*	11.70	12.40	13.55	....
Vandergrift,Pa. U5	.....	9.875*	11.70	12.40	13.55	14.65
Warren,O. R2	.....	9.875*	11.70	12.40	13.55	14.65
Zanesville,O. A10	.....	....	11.70†	12.40	13.55	14.65
						Stator
Mansfield,O. E6						8.10
Vandergrift,Pa. U5						8.10
Warren,O. R2 (Locore)						8.10

SHEETS (22 Ga., coils & cut lengths)

Fully Processed (Semiprocessed ½c lower)	T-72	T-65	T-58	T-52
BeechBottom,W.Va. W10	15.70	16.30	16.80	17.85
Vandergrift,Pa. U5	15.70	16.30	16.80	17.85
Zanesville,O. A10	15.70	16.30	16.80	17.85

C.R. COILS & CUT LENGTHS (22 Ga.)	Grain Oriented T-100	T-90	T-80	T-73	T-66	T-72
Brackenridge,Pa. A4	..	18.10	19.70	20.20	20.70	15.70††
Butler,Pa. A10	....	....	19.70	20.20	20.70	....
Vandergrift,Pa. U5	17.10	18.10	19.70	20.20	20.70	15.70
Warren,O. R2	....	....	....	....	....	15.70‡

*Semiprocessed. †Fully processed only. §Coil annealed; semiprocessed ½c lower. ††Coils only.

WIRE

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...8.00
Aliquippa,Pa. J5 .....8.00
Alton,Ill. L1 .....8.20
Atlanta A1 .....8.00
Bartonville,Ill. K4 .....8.10
Buffalo W12 .....8.00
Chicago W13 .....8.00
Cleveland A7, C20 .....8.00
Crawfordsville,Ind. M8..8.10
Donora,Pa. A7 .....8.00
Duluth A7 .....8.00
Fairfield,Ala. T2 .....8.00
Fostoria,O.(24) S1 .....8.10
Houston S5 .....8.25
Jacksonville,Fla. M8 ...8.35
Johnstown,Pa. B2 .....8.00
Joliet,Ill. A7 .....8.00
KansasCity,Mo. S5 .....8.25
Kokomo,Ind. C16 .....8.10
LosAngeles B3 .....8.95
Minnequa,Colo. C10 .....8.25
Monessen,Pa. P7, P16 ..8.00
N.Tonawanda S47 .....8.00
Palmer,Mass. W12 .....8.30
Pittsburg,Calif. C11 ....8.95
Portsmouth,O. P12 .....8.00
S.Chicago,Ill. R2 .....8.00
S.SanFrancisco C10 ....8.95
SparrowsPoint,Md. B2 ..8.10
Sterling,Ill.(1) N15 ...8.00
Sterling,Ill. N15 .....8.10
Struthers,O. Y1 .....8.00
Waukegan,Ill. A7 .....8.00
Worcester,Mass. A7 ....8.30

WIRE, Cold Heading Carbon

Elyria,O. W8 .....8.00
N.Tonawanda S47 .....8.00

WIRE, Gal'd., for ACSR

Bartonville,Ill. K4 .....12.65
Buffalo W12 .....13.40
Cleveland A7 .....12.65
Donora,Pa. A7 .....12.65
Duluth A7 .....12.65
Johnstown,Pa.(10) B2 .12.65
KansasCity,Mo. U3 ....12.90
LosAngeles(2) B3 .....13.60
Minnequa,Colo. C10 ..12.775
Monessen,Pa. P7, P16 .12.65
Muncie,Ind. I-7 .....13.60
NewHaven,Conn. A7 ....12.95
Palmer,Mass. W12 ....13.70
Pittsburg,Calif. C11 ....13.45
Portsmouth,O. P12 ....12.65
Roebling,N.J. R5 .....12.95
SparrowsPt.,Md.(10)B2 12.75
Struthers,O. Y1 .....13.40
Trenton,N.J. A7 .....12.95
Waukegan,Ill. A7 .....12.65
Worcester,Mass. A7 ...12.95

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
Kokomo,Ind. C16 .....9.85
LosAngeles B3 .....10.70
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
NewHaven,Conn. A7 ..10.95
Palmer,Mass. W12 ....10.05
Pittsburg,Calif. C11 ..10.075
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ...10.075
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Worcester,Mass. A7 ...10.05

WIRE, MB Spring, High-Carbon

Aliquippa,Pa. J5 .....9.75
Alton,Ill. L1 .....9.95
Bartonville,Ill. K4 .....9.85
Buffalo W12 .....9.75
Cleveland A7 .....9.75
Donora,Pa. A7 .....9.75
Duluth A7 .....9.75
Fostoria,O. S1 .....9.80
Johnstown,Pa. B2 .....9.75
KansasCity,Mo. S5, U3.10.00
LosAngeles B3 .....10.20
Milbury,Mass.(12) N6 .10.05
Minnequa,Colo. C10 ....9.95
Monessen,Pa. P7, P16 ..9.75
Muncie,Ind. I-7 .....9.95
Palmer,Mass. W12 .....10.05
Pittsburg,Calif. C11 ....10.20
Portsmouth,O. P12 .....9.75
Roebling,N.J. R5 .....10.05
S.Chicago,Ill. R2 .....9.75
S.SanFrancisco C10 ....10.20
SparrowsPt.,Md. B2 ....9.85
Struthers,O. Y1 .....9.75
Trenton,N.J. A7 .....10.05
Waukegan,Ill. A7 .....9.75
Wor'ster,Mass.A7,J4,T6 10.05

WIRE, Fine & Weaving(8" Coils)

Alton,Ill. L1 .....16.50
Bartonville,Ill. K4 .....16.40
Chicago W13 .....16.30
Cleveland A7 .....16.30
Crawfordsville,Ind. M8..16.40
Fostoria,O. S1 .....16.30
Houston S5 .....16.55
Jacksonville,Fla. M8 ...16.65
Johnstown,Pa. B2 .....16.30
KansasCity,Mo. S5 .....16.55
Kokomo,Ind. C16 .....16.30
Minnequa,Colo. C16 ....16.55
Monessen,Pa. P16 .....16.30
Muncie,Ind. I-7 .....16.50
Palmer,Mass. W12 .....16.60
S.SanFrancisco C10 ....17.15
Waukegan,Ill. A7 .....16.30
Worcester,Mass. A7,J6.16.60

ROPE WIRE (A)

Bartonville,Ill. K4 ....13.45
Buffalo W12 .....13.45
Fostoria,O. S41 .....13.45
Johnstown,Pa. B2 .....13.45
Monessen,Pa. P7 .....13.45
Muncie,Ind. I-7 .....13.65
Palmer,Mass. W12 .....13.75
Portsmouth,O. P12 .....13.45
Roebling,N.J. R5 .....13.75
St. Louis L8 .....13.45
SparrowsPt.,Md. B2 ...13.55
Struthers,O. Y1 .....13.45
Worcester,Mass. J4 ...13.75
(A) Plow and Mild Plow; add 0.25c for Improved Plow.

WIRE, Tire Bead

Bartonville, Ill. K4	17.15
Monessen,Pa. P16	17.15
Roebling,N.J. R5	17.65

WIRE, Cold-Rolled Flat

Anderson,Ind. G6	12.35
Baltimore T6	12.65
Boston T6	12.65
Buffalo W12	12.35
Chicago W13	12.45
Cleveland A7	12.35
Crawfordsville,Ind. M8	12.35
Dover,O. G6	12.35
Evanston,Ill. M22	12.45
Farrell,Pa. S3	12.35
Fostoria,O. S1	12.35
FranklinPark,Ill. T6	12.45
Kokomo,Ind. C16	12.35
Massillon,O. R8	12.35
Milwaukee C23	12.55
Monessen,Pa. P7, P16	12.35
NewCastle,Pa. M23	12.35
Palmer,Mass. W12	12.65
Pawtucket,R.I. N8	12.65
Philadelphia P24	12.65
Riverdale,Ill. A1	12.45
Rome,N.Y. R6	12.35
Sharon,Pa. S3	12.35
Trenton,N.J. R5	12.65
Warren,O. B9	12.35
Worcester,Mass. A7, T6	12.65

NAILS, Stock Sizes

	Col.
AlabamaCity,Ala. R2	173
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Chicago W13	173
Cleveland A9	173
Crawfordsville,Ind. M8	175
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	178
Jacksonville,Fla. M8	175
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	178
Kokomo,Ind. C16	175
Minnequa,Colo. C10	178
Monessen,Pa. P7	173
Pittsburg,Calif. C11	192
Rankin,Pa. A7	173
S.Chicago,Ill. R2	173
SparrowsPt.,Md. B2	175
Sterling,Ill. (7) N15	175
Worcester,Mass. A7	179

(To Wholesalers: per cwt)

Galveston,Tex. D7	$10.30

NAILS, Cut (100 lb kegs)

Wheeling,W.Va. W10	$10.10

POLISHED STAPLES

	Col.
AlabamaCity,Ala. R2	175
Aliquippa,Pa. J5	173
Atlanta A11	173
Bartonville,Ill. K4	175
Crawfordsville,Ind. M8	177
Donora,Pa. A7	173
Duluth A7	173
Fairfield,Ala. T2	173
Houston S5	180
Jacksonville,Fla. M8	177
Johnstown,Pa. B2	173
Joliet,Ill. A7	173
KansasCity,Mo. S5	180
Kokomo,Ind. C16	177
Minnequa,Colo. C10	178
Pittsburg,Calif. C11	194
Rankin,Pa. A7	173
S.Chicago,Ill. R2	175
SparrowsPt.,Md. B2	175
Sterling,Ill.(7) N15	175
Worcester,Mass. A7	179

TIE WIRE, Automatic Baler (14½ Ga.) (per 97 lb net box) Coil No. 3150

AlabamaCity,Ala. R2	$8.78
Atlanta A11	10.36
Bartonville,Ill. K4	8.88
Buffalo W12	10.26
Chicago W13	9.24
Crawfordsville,Ind. M8	8.88
Donora,Pa. A7	8.78
Duluth A7	8.78
Fairfield,Ala. T2	8.78
Houston S5	9.02
Jacksonville,Fla. M8	8.88
Johnstown,Pa. B2	8.78
Joliet,Ill. A7	8.78
KansasCity,Mo. S5	9.02
Kokomo,Ind. C16	8.88
LosAngeles B3	9.20
Minnequa,Colo. C10	8.02
Pittsburg,Calif. C11	9.20
S.Chicago,Ill. R2	8.78
S.SanFrancisco C10	9.20
SparrowsPt.,Md. B2	8.88
Sterling,Ill.(37) N15	8.88

Coil No. 6500 Stand. 100 lb coil

AlabamaCity,Ala. R2	$9.06
Atlanta A11	10.70
Bartonville,Ill. K4	9.16
Buffalo W12	10.60
Chicago W13	9.54
Crawfordsville,Ind. M8	9.16
Donora,Pa. A7	9.06
Duluth A7	9.06
Fairfield,Ala. T2	9.06
Houston S5	9.30
Jacksonville,Fla. M8	9.16
Johnstown,Pa. B2	9.06
Joliet,Ill. A7	9.06
KansasCity,Mo. S5	9.30
Kokomo,Ind. C16	9.16
LosAngeles B3	9.50
Minnequa,Colo. C10	9.30
Pittsburg,Calif. C11	9.50
S.Chicago,Ill. R2	9.06
S.SanFrancisco C10	9.50
SparrowsPt.,Md. B2	9.16
Sterling,Ill.(37) N15	9.16

Coil No. 6500 Interim 100 lb coil

AlabamaCity,Ala. R2	$9.11
Atlanta A11	10.75
Bartonville,Ill. K4	9.21
Buffalo W12	10.65
Chicago W13	9.59
Crawfordsville,Ind. M8	9.21
Donora,Pa. A7	9.11
Duluth A7	9.11
Fairfield,Ala. T2	9.11
Houston S5	9.35
Jacksonville,Fla. M8	9.21
Johnstown,Pa. B2	9.11
Joliet,Ill. A7	9.11
KansasCity,Mo. S5	9.35
Kokomo,Ind. C16	9.21
LosAngeles B3	9.55
Minnequa,Colo. C10	9.35
Pittsburg,Calif. C11	9.55
S.Chicago,Ill. R2	9.11
S.SanFrancisco C10	9.55
SparrowsPt.,Md. B2	9.21
Sterling,Il.(37) N15	9.21

BALE TIES, Single Loop

	Col.
AlabamaCity,Ala. R2	212
Atlanta A11	212
Bartonville,Ill. K4	214
Crawfordsville,Ind. M8	214
Donora,Pa. A7	212
Duluth A7	212
Fairfield,Ala. T2	212
Houston S5	217
Jacksonville,Fla. M8	214
Joliet,Ill. A7	212
KansasCity,Mo. S5	217
Kokomo,Ind. C16	214
Minnequa,Colo. C10	217
SparrowsPt.,Md. B2	214
Sterling,Ill.(7) N15	214

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	193**
Aliquippa,Pa. J5	190§
Atlanta A11	197*
Bartonville,Ill. K4	199
Crawfordsville,Ind. M8	198
Donora,Pa. A7	193†
Duluth A7	193†
Fairfield,Ala. T2	193†
Houston S5	198**
Jacksonville,Fla. M8	198
Johnstown,Pa. B2	196§
Joliet,Ill. A7	193†
KansasCity,Mo. S5	198**
Kokomo,Ind. C16	195†
Minnequa,Colo. C10	198**
Monessen,Pa. P7	196§
Pittsburg,Calif. C11	213†
Rankin,Pa. A7	193†
S.Chicago,Ill. R2	193**
SparrowsPoint,Md. B2	198§
Sterling,Ill.(7) N15	198

WIRE (16 gage)	An'ld Stone	Galv. Stone
Ala.City,Ala.R2	17.85	19.40**
Aliq'ppa.Pa. J5	17.85	19.65
Bartonville K4	17.95	19.80
Chicago W13	17.85	....
Cleveland A7	17.85	....
Craw'sville M8	17.95	19.80††
Fostoria,O. S1	18.35	19.90†
Houston S5	18.10	19.65**
Jacksonville M8	17.95	19.80††
Johnstown B2	17.85	19.65§
Kan.City,Mo. S5	18.10	....
Kokomo C16	17.95	19.50†
Minnequa C10	18.10	19.65**
P'lm'r,Mass.W12	19.10	19.70†
Pitts.,Calif. C11	18.20	19.75†
S.SanFran. C10	18.20	19.75**
SparrowsPt. B2	17.95	19.75§
St'ling(37) N15	17.95	19.80
Waukegan A7	17.85	19.40†
Worcester A7	18.15	....

FENCE POSTS

	Col.
Birmingham C15	177
ChicagoHts.,Ill. C2, I-2	177
Duluth A7	177
Franklin,Pa. F5	177
Johnstown,Pa. B2	177
Marion,O. P11	177
Minnequa,Colo. C10	182
Tonawanda,N.Y. B12	177

WOVEN FENCE, 9-15 Ga.

	Col.
Ala.City,Ala. R2	187**
Aliq'ppa.Pa.9-11½Ga.J5	190§
Atlanta A11	191*
Bartonvil.e,Ill. K4	193
Crawfordsville,Ind. M8	192
Donora,Pa. A7	187†
Du.uth A7	187†
Fairfield,Ala. T2	187†
Houston S5	192**
Jacksonville,Fla. M8	192
Johnstown,Pa.(42) B2	190§
Joliet,Ill. A7	187†
KansasCity,Mo. S5	192**
Kokomo,Ind. C16	189†
Minnequa,Colo. C10	192**
Pittsburg,Calif. C11	210†
Rankin,Pa. A7	187†
S.Chicago,Ill. R2	187**
Sterling,Ill.(7) N15	192

WIRE, Merchant Quality 6 to 8 gage

	An'ld	Galv.
Ala.City,Ala. R2	9.00	9.55**
Aliquippa J5	8.65	9.325§
Atlanta(48) A11	9.00	9.75*
Bartonville(48) K4	9.10	9.85
Buffalo W12	9.00	9.55†
Chicago W13	9.00	9.55**
Cleveland A7	9.00	....
CrawfordsvilleM8	9.10	9.80††
Donora,Pa. A7	9.00	9.55†
Duluth A7	9.00	9.55†
Fairfield T2	9.00	9.55
Houston(48) S5	9.25	9.80**
Jack'vill,Fla. M8	9.10	9.80††
Johnstown(48) B2	9.00	9.675§
Joliet,Ill. A7	9.00	9.55†
KansasCity(48)S5	9.25	9.80**
Kokomo(48) S16	9.10	9.65†
LosAngeles B3	9.95	10.625§
Minnequa C10	9.25	9.80**
Monessen(48) P7	8.65	9.35§
Palmer,Mass. W12	9.30	9.85†
Pitts.,Calif. C11	9.95	10.50†
Rankin,Pa. A7	9.00	9.55†
S.Chicago R2	9.00	9.55**
S.SanFran. C10	9.95	10.50**
Spar'wsPt.(48)B2	9.10	9.775§
St'ling(37)(48)N15	9.10	9.80
Struthers,O. Y1	9.00	9.65‡
Worcester,Mass.A7	9.30	9.85†

Based on zinc prices of: *13.50c. †5c. §10c. ‡Less than 10c. ††10.50c. ‡‡11.10c. **Subject to zinc equalization extras.

FASTENERS

SCREWS, NUTS, BOLTS

(Consumer discounts per cent off list prices, plain finishes. For less than full container quantities, add 25 per cent; attaching nuts to bolts in sizes ¼ in. through ⅝ in. diameter through 8 in. in length, price on application. Discounts are determined by the quantity of screws, nuts, and bolts ordered for one destination at one time.)

Base, one keg	43.00
20,000 lb or more	53.00

SCREWS, SETSCREWS

Hex Screws and High Strength Hex Screws, through 1 in. x 12 in.:

Base, one keg	43.00
20,000 lb or more	53.00

Hex Screws 1¼ in. diameter and larger: See net price schedule.

Fillister Head Screws, coarse thread:

Packages	+70.00
Bulk	+28.00

Flat Head Screws, coarse thread:

Packages	+100.00
Bulk	+52.00

Setscrews, Square Head, Cup-point, coarse thread:

Packages	+10.00
Bulk	15.00

(Bulk discounts on fillister, flat head, and set screws apply only to products ordered in these minimum quantities: ¼ in. through ⅜ in. diameter, 15,000 pieces; ⅞ in. through ⅝ in. diameter, 5000 pieces; and ¾ in. through 1 in. diameter, 2000 pieces.)

RIVETS

F.o.b. Cleveland and/or freight equalized with Pittsburg. f.o.b. Chicago and/or freight equalized with Birmingham except where equalization is too great.

Structural ½ in. larger 12.85
7/16 in. and smaller by 6 in. and shorter, 15% off list.

PRESTRESSED STRAND

(High strength, stress relieved; 7 wire uncoated. Net prices per 1000 ft, 40,000 lb and over.)

	Standard Diameter, Inches				
	1/4	5/16	3/8	7/16	1/2
Buffalo W12	$26.20	$38.50	$47.90	$61.30	$80.30
KansasCity,Mo. U3	26.20	38.50	47.90	61.30	80.30
Minnequa,Colo. C10	26.20	38.50	47.90	61.30	80.30
Pittsburg,Calif. C11	26.20	38.50	47.90	61.30	80.30
Roebling,N.J. R5	26.20	38.50	47.90	61.30	80.30
SparrowsPoint,Md. B2	26.20	38.50	47.90	61.30	80.30
St.Louis L8	26.20	38.50	47.90	61.30	80.30
Waukegan,Ill. A7	26.20	38.50	47.90	61.30	80.30

BOILER TUBES

Net base c.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut length 10 to 24 ft, inclusive.

O.D. In.	B.W. Gage	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.
1	13	....	27.24	23.12
1¼	13	....	32.25	24.41
1½	13	30.42	35.65	26.98
1¾	13	35.94	42.12	31.89
2	13	40.28	47.21	35.74
2¼	13	45.36	58.17	40.26
2½	12	49.24	57.72	43.70
2½	12	54.23	63.57	48.13
2¾	12	58.73	68.83	52.13
3	12	62.62	73.40	55.59

RAILWAY MATERIALS

Rails	Standard No. 1	Standard No. 2	All No. 2	Tee Rails 60 lb Under
Bessemer,Pa. U5	5.75	5.65	....	6.725
Ensley,Ala. T2	5.75	5.65	....	6.725
Fairfield,Ala. T2	....	....	....	6.725
Gary,Ind. U5	5.75	5.65	....	....
Huntington,W.Va. C15	....	....	....	6.725
Johnstown,Pa. B2	....	....	....	(16)6.725
Lackawanna,N.Y. B2	5.75	5.65	....	6.725
Minnequa,Colo. C10	5.75	5.65	....	7.725
Steelton,Pa. B2	5.75	5.65	....	....

TIE PLATES

Fairfield,Ala. T2	6.875
Gary,Ind. U5	6.875
Lackawanna,N.Y. B2	6.875
Minnequa,Colo. C10	6.875
Seattle B3	7.025
Steelton,Pa. B2	6.875
Torrance,Calif. C11	7.025

JOINT BARS

Bessemer,Pa. U5	7.25
Fairfield,Ala. T2	7.25
Joliet,Ill. U5	7.25
Lackawanna,N.Y. B2	7.25
Minnequa,Colo. C10	7.25
Steelton,Pa. B2	7.25

AXLES

Ind.Harbor,Ind. S13	9.125
Johnstown,Pa. B2	9.125

SCREW SPIKES

Lebanon,Pa. B2	15.10

TRACK BOLTS, Untreated

Cleveland R2	15.35
KansasCity,Mo. S5	15.35
Lebanon,Pa. B2	15.35
Minnequa,Colo. C10	15.35
Pittsbugh S14	15.35
Seattle B3	15.85

STANDARD TRACK SPIKES

Fairfield,Ala. T2	10.10
Ind.Harbor,Ind. I-2, Y1	10.10
KansasCity,Mo. S5	10.10
Lebanon,Pa. B2	10.10
Minnequa,Colo. C10	10.10
Pittsburgh J5	10.10
Seattle B3	10.60
S.Chicago, Ill. R2	10.10
Struthers,O. Y1	10.10
Youngstown R2	10.10

FOOTNOTES

(1) Chicago base.
(2) Double galvanized.
(3) Merchant.
(4) Reinforcing.
(5) 1½ to under 1 7/16 in.; 1 7/16 to under 1 15/16 in., 6.70c; 1 15/16 to 8 in., inclusive, 7.05c.
(6) Limited analyses only.
(7) Chicago base 2 cols. lower.
(8) 16 Ga. and heavier.
(9) Merchant quality; add 0.35c for special quality.
(10) Bethany A coating.
(12) Worcester, Mass., base.
(15) ⅝" and thinner.
(16) 40 lb and under.
(17) Flats only; 0.25 in. & heavier.
(23) Special quality.
(24) Deduct 0.05c, finer than 15 Ga.
(25) Bar mill bands.
(27) Bar mill sizes.
(28) Bonderized.
(30) Sheared; for universal mill add 0.45c.
(31) Widths over ⅝ in.: 7.375c, for widths ⅝ in. and under by 0.125 in. and thinner.
(32) Buffalo base.
(33) 14 Ga., 48 in.
(35) 72" and narrower.
(36) 54" and narrower.
(37) Chicago base, 10 points lower.
(38 13 Ga. & lighter 60" & narrower.
(39) 48" and narrower.
(43) 9-14½ Ga.
(44) To fabricators.
(48) 6-7 Ga.
(49) 3½ in. and smaller rounds and 2½ in. and smaller hexagons; 9.625c for larger rounds and hexagons and other shapes.

SEAMLESS STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	2		2½		3		3½		4		5		6	
List Per Ft	37c		58.5c		76.5c		92c		$1.09		$1.48		$1.92	
Pounds Per Ft	3.68		5.82		7.62		9.20		10.89		14.81		19.18	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Ambridge, Pa. N2	+12.25	....	+5.75	....	+3.25	....	+1.75	....	+1.75	....	+2	....	0.5	....
Lorain, O. N3	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25
Youngstown Y1	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

ELECTRICWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Youngstown R2	+12.25	+28.75	+5.75	+23.5	+3.25	+21	+1.75	+19.5	+1.75	+19.5	+2	+19.75	0.5	+17.25

BUTTWELD STANDARD PIPE, Threaded and Coupled

Carload discounts from list, %

Size—Inches	⅛		¼		⅜		½		¾		1		1¼	
List Per Ft	5.5c		6c		6c		8.5c		11.5c		17c		23c	
Pounds Per Ft	0.24		0.42		0.57		0.85		1.13		1.68		2.28	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Alton, Ill. L1	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Benwood, W. Va. W10	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Butler, Pa. F6	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Etna, Pa. N2	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Fairless, Pa. N3	....	....	....	....	....	....	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Fontana, Calif. K1	....	....	....	....	....	....	+10.75	+28	+7.75	+24	+4.25	+19.5	+1.75	+18.25
Indiana Harbor, Ind. Y1	....	....	....	....	....	....	1.25	+16	4.25	+12	7.75	+7.5	10.25	+6.25
Lorain, O. N3	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sharon, Pa. S4	4.5	+24	+8.5	+34	+19.5	+44	....	....	....	....	....	....	....	....
Sharon, Pa. M6	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Sparrows Pt., Md. B2	2.5	+26	+10.5	+36	+21.5	+46	0.25	+17	3.25	+13	6.75	+8.5	9.25	+7.25
Wheatland, Pa. W9	4.5	+24	+8.5	+34	+19.5	+44	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25
Youngstown R2, Y1	....	....	....	....	....	....	2.25	+15	5.25	+11	8.75	+6.5	11.25	+5.25

Size—Inches	1½		2		2½		3		3½		4	
List Per Ft	27.5c		37c		58.5c		76.5c		92c		$1.09	
Pounds Per Ft	2.75		3.68		5.82		7.62		9.20		10.89	
	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*	Blk	Galv*
Aliquippa, Pa. J5	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Alton, Ill. L1	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Benwood, W. Va. W10	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Etna, Pa. N2	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Fairless, Pa. N3	9.75	+6.25	10.25	+5.25	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Fontana, Calif. K1	+1.25	+17.25	+0.75	+16.75	0.75	+16.5	0.75	+16.5	+9.75	+27.5	+9.75	+27.5
Indiana Harbor, Ind. Y1	10.75	+5.25	11.25	+4.75	12.75	+4.5	12.75	+4.5	2.25	+15.5	2.25	+15.5
Lorain, O. N3	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	....	....	....	....
Sharon, Pa. M6	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Sparrows Pt., Md. B2	9.75	+6.25	10.25	+5.75	11.75	+5.5	11.75	+5.5	1.25	+16.5	1.25	+16.5
Wheatland, Pa. W9	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5
Youngstown R2, Y1	11.75	+4.25	12.25	+3.75	13.75	+3.5	13.75	+3.5	3.25	+14.5	3.25	+14.5

*Galvanized pipe discounts based on price of zinc at 11.50c, East St. Louis.

Stainless Steel

Representative prices, cents per pound; subject to current lists of extras

AISI Type	—Rerolling— Ingot	Slabs	Forging Billets	H.R. Strip	H.R. Rods; C.F. Wire	Bars; Structural Shapes	Plates	Sheets	C.R. Strip; Flat Wire
201	22.75	25.00	....	36.00	41.50	43.50	39.25	48.50	43.50
202	24.75	28.25	37.75	39.00	42.25	44.50	40.00	49.25	46.75
301	24.00	26.00	38.75	37.25	43.50	46.00	41.25	51.25	45.00
302	26.25	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
302B	26.50	30.75	42.25	45.75	46.75	49.00	44.50	57.00	57.00
303	....	33.25	42.50	....	47.25	49.75	45.00	56.75	56.75
304	28.00	29.50	39.50	40.50	44.25	46.75	42.25	52.00	49.50
304L	....	37.25	47.25	48.25	52.00	54.50	50.00	59.75	57.25
305	29.50	34.75	44.00	47.50	47.00	49.50	46.25	58.75	58.75
308	32.00	36.25	49.00	50.25	54.75	57.75	55.25	63.00	63.00
309	41.25	47.50	60.00	64.50	66.25	69.50	66.00	80.50	80.50
310	51.50	59.50	81.00	84.25	89.75	94.50	87.75	96.75	96.75
314	....	....	....	....	89.75	94.50	87.75	....	104.25
316	41.25	47.50	64.50	68.50	71.75	75.75	71.75	80.75	76.75
316L	....	55.25	72.25	76.25	79.50	83.50	79.50	88.50	84.50
317	49.75	58.00	79.75	88.25	89.50	94.25	88.50	101.00	101.00
321	33.50	38.00	48.75	53.50	54.50	57.50	54.75	65.50	62.25
330	....	....	123.25	....	98.75	143.75	135.00	149.25	149.25
18-8 Cb-Ta	38.50	48.25	57.75	63.50	63.75	67.25	64.75	79.25	75.25
403	....	....	26.75	....	29.75	31.50	30.00	40.25	40.25
405	20.25	26.50	30.75	36.00	34.75	36.50	32.50	46.75	46.75
410	17.50	19.50	26.75	31.00	29.75	31.50	30.00	40.25	40.25
416	....	....	29.75	....	33.75	35.50	31.25	48.25	48.25
420	....	31.50	35.50	41.75	40.75	42.75	40.25	62.00	62.00
430	17.75	19.75	29.75	32.00	33.75	35.50	31.00	40.75	38.75
430F	....	....	30.50	....	34.25	36.00	31.75	51.75	42.00
431	....	29.75	39.25	....	43.50	46.00	41.00	56.00	56.00
446	....	....	40.75	59.00	46.00	48.25	42.75	70.00	70.00

Producers Are: Allegheny Ludlum Steel Corp.; American Steel & Wire Div., U. S. Steel Corp.; Anchor Drawn Steel Co., division of Vanadium-Alloys Steel Co.; Armco Steel Corp.; Babcock & Wilcox Co.; Bethlehem Steel Co.; J. Bishop & Co.; A. M. Byers Co.; Calstrip Steel Corp.; G. O. Carlson Inc.; Carpenter Steel Co.; Carpenter Steel Co. of New England; Charter Wire Products; Crucible Steel Co. of America; Damascus Tube Co.; Dearborn Div., Sharon Steel Corp.; Wilbur B. Driver Co.; Driver-Harris Co.; Eastern Stainless Steel Corp.; Firth Sterling Inc.; Fort Wayne Metals Inc.; Green River Steel Corp., subsidiary of Jessop Steel Co.; Indiana Steel & Wire Co.; Ingersoll Steel Div., Borg-Warner Corp.; Elwood Ivins Steel Tube Works Inc.; Jessop Steel Co.; Johnson Steel & Wire Co. Inc.; Stainless & Strip Div., Jones & Laughlin Steel Corp.; Joslyn Stainless Steels, division of Joslyn Mfg. & Supply Co.; Latrobe Steel Co.; Lukens Steel Co.; Maryland Fine & Specialty Wire Co. Inc.; McLouth Steel Corp.; Metal Forming Corp.; Midvale-Heppenstall Co.; National Standard Co.; National Tube Div., U. S. Steel Corp.; Pacific Tube Co.; Page Steel & Wire Div., American Chain & Cable Co. Inc.; Phoenix Steel Corp.; Pittsburgh Rolling Mills Inc.; Republic Steel Corp.; Riverside-Alloy Metal Div., H. K. Porter Company Inc.; Rodney Metals Inc.; Sawhill Tubular Products Inc.; Sharon Steel Corp.; Simonds Saw & Steel Co.; Somers Brass Co.; Specialty Wire Co. Inc.; Standard Tube Co.; Superior Steel Div., Copperweld Steel Co.; Superior Tube Co.; Swepco Tube Corp.; Techalloy Co. Inc.; Timken Roller Bearing Co.; Trent Tube Co., subsidiary of Crucible Steel Co. of America; Tube Methods Inc.; Ulbrich Stainless Steels, Inc.; Union Steel Corp.; U. S. Steel Corp.; Universal Cyclops Corp.; Vanadium-Alloy Steel Co., Wall Tube & Metal Products Co.; Wallingford Steel, subsidiary of Allegheny Ludlum Steel Corp.; Washington Steel Corp.; Seymour Mfg. Co.

Clad Steel

	Plates 5%	Plates Carbon Base 10%	Plates Carbon Base 15%	Plates Carbon Base 20%	Sheets Carbon Base 20%
Stainless					
302	....	....	....	....	37.50
304	26.05	28.80	31.55	34.30	39.75
304L	30.50	33.75	36.95	40.15	....
316	38.20	42.20	46.25	50.25	58.25
316L	42.30	46.75	51.20	55.65	....
316 Cb	49.90	55.15	60.40	65.65	....
321	31.20	34.50	37.75	41.05	47.25
347	36.90	40.80	44.65	48.55	57.00
405	22.25	24.60	26.90	29.25	....
410	20.55	22.70	24.85	27.00	....
430	21.20	23.45	25.65	27.90	....
Inconel	49.80	61.35	72.80	84.40	....
Nickel	43.20	55.05	66.95	78.90	....
Nickel, Low Carbon	43.50	55.70	67.95	80.35	....
Monel	44.25	55.35	66.45	77.60	....

	Strip, Carbon Base —Cold Rolled— 10%	Both Sides
Copper*	36.10	43.00

*Deoxidized. Production points: Stainless-clad sheets, New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. P4; Coatesville, Pa. L7; New Castle, Ind. I-4, and Washington, Pa. J3; nickel, inconel, monel-clad plates, Claymont, Del. P4; Coatesville L7; copper-clad strip, Carnegie, Pa. S18.

Tool Steel

Grade	$ per lb	Grade	$ per lb
Reg. Carbon (W-1)	0.330	Hi-Carbon-Cr (D-11)	0.955
Spec. Carbon (W-1)	0.385	V-Cr Hot Work (H-13)	0.550
Oil Hardening (O-1)	0.505	W-Cr Hot Work (H-12)	0.530
V-Cr Hot Work (H-11)	0.505	W Hot Wk (H-21)	1.425-1.44

Grade by Analysis (%) W	Cr	V	Co	Mo	AISI Designation	$ per lb
18	4	1	....	...	T-1	1.840
18	4	2	....	...	T-2	2.005
13.5	4	3	....	...	T-3	2.105
18.25	4.25	1	4.75	...	T-4	2.545
18	4	2	9	...	T-5	2.915
20.25	4.25	1.6	12.95	...	T-6	4.330
13.75	3.75	2	5	...	T-8	2.485
1.5	4	1	....	8.5	M-1	1.200
6.4	4.5	1.9	....	5	M-2	1.345
6	4	3	....	6	M-3	1.590

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, F2, J3, L3, M14, S8, U4, V2, and V3.

Pig Iron

Prices in dollars per gross ton, f.o.b. (rail) furnace; add 50 cents when shipped by truck. Maximum delivered prices are approximate and based on rail shipment.

	Basic	No. 2 Foundry	Malle-able	Besse-mer
Birmingham District				
Birmingham R2	62.00	62.50**	66.50	....
Birmingham U6	....	62.50**	66.50	....
Woodward, Ala. W15	62.00*	62.50**	66.50	....
Cincinnati, deld.	....	70.20	....	....
Buffalo District				
Buffalo H1, R2	66.00	66.50	67.00	67.50
No. Tonawanda, N.Y. T9	....	66.50	67.00	67.50
Tonawanda, N.Y. W12	66.00	66.50	67.00	67.50
Boston, deld.	77.29	77.79	78.29	....
Rochester, N.Y., deld.	69.02	69.52	70.02	....
Syracuse, N.Y., deld.	70.12	70.62	71.12	....
Chicago District				
Chicago I-3	66.00	66.50	66.50	67.00
S. Chicago, Ill. R2	66.00	66.50	66.50	67.00
S. Chicago, Ill. W14	66.00	....	66.50	67.00
Milwaukee, deld.	68.81	69.31	69.31	69.81
Muskegon, Mich., deld.	....	74.46	74.46	....
Cleveland District				
Cleveland R2, A7	66.00	66.50	66.50	67.00
Akron, Ohio, deld.	69.52	70.02	70.02	70.52
Mid-Atlantic District				
Birdsboro, Pa. B10	68.00	68.50	69.00	69.50
Chester, Pa. P4	Nom.	Nom.	Nom.	....
Swedeland, Pa. A3	68.00	68.50	69.00	69.50
NewYork, deld.	....	75.41	75.91	....
Newark, N.J., deld.	72.53	73.03	73.53	74.03
Philadelphia, deld.	70.18	70.68	71.18	71.68
Troy, N.Y. R2	68.00	68.50	69.00	69.50
Boston, deld.	75.20	75.70	76.20	76.70
Pittsburgh District				
Neville Island, Pa. P6	66.00	66.50	66.50	67.00
Pittsburgh (N&S sides), deld.	....	68.31	68.31	68.81
Monaca, Pa., deld.	....	68.33	68.33	68.83
Lawrenceville, W. Homestead, Wilmerding, Pa., deld.	....	68.68	68.68	69.18
Verona, Trafford, Pa., deld.	68.83	69.33	69.33	69.83
Brackenridge, Pa., deld.	69.16	69.66	69.66	70.16
Midland, Pa. C18	66.00	....	....	....
Youngstown District				
Hubbard, Ohio Y1	....	....	66.50	....
Sharpsville, Pa. S6	66.00	....	66.50	67.00
Youngstown Y1	....	....	66.50	....
Other U. S. Districts				
Duluth I-3	66.00	66.50	66.50	67.00
Erie, Pa. I-3	66.00	66.50	66.50	67.00
Fontana, Calif. K1	75.00	75.50	....	....
Geneva, Utah C11	66.00	66.50	....	....
Granite City, Ill. G4	67.90	68.40	68.90	....
Ironton, Utah C11	66.00	66.50	....	....
Minnequa, Colo. C10	68.00	68.50	69.00	....
Rockwood, Tenn. T3	62.00	62.50‡	66.50	67.00
Toledo, Ohio I-3	66.00	66.50	66.50	67.00
Cincinnati, deld.	72.94	73.44	....	....
Mansfield, Ohio, deld.	....	....	71.34	....
Canadian District				
Hamilton, Ont. S46	65.00	65.00	65.50	....
Port Colborne, Ont. A25	65.00	65.00	65.50	66.00
Sault Ste. Marie, Ont. A25	65.00	65.00	65.50	66.00

*Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.
**Phos. 0.70-0.90%; Phos. 0.30-0.69%, $63.50.
‡Phos. 0.50% up; Phos. 0.30-0.49%, $63.50.

PIG IRON DIFFERENTIALS

Silicon: Add 75 cents per ton for each 0.25% Si or percentage thereof over base grade, 1.75-2.25%, except on low phos. iron on which base is 1.75-2.00%. Foundry grade, 1.75% or under, deduct 50c.

Manganese: Add 50 cents per ton for each 0.25% manganese over 1% or portion thereof.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.01-6.50% silicon; add 75c for each 0.50% silicon or portion thereof over the base grade within a range of 6.50 to 13%; starting with silicon over 13% add $1 per ton for each 0.50% silicon or portion thereof up to 14%; over 14%, price is $93 with $1 differential; add $1 for each 0.50% Mn over 1%)

Buffalo H1	$79.25
Jackson, Ohio I-3, J1	78.00
Port Colborne, Ont. A25	78.50
Toledo, Ohio I-3	78.00

ELECTRIC FURNACE SILVERY IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.50% Si to 18%; $1.25 for each 0.50% Mn over 1%; $2 per gross ton premium for 0.045% max P)

Calvert City, Ky. P15	$99.00
Niagara Falls, N.Y. P15	99.00
Keokuk, Iowa Open-hearth & Fdry. K2	89.00
Keokuk, Iowa O.H. & Fdry. 12½ lb piglets, 16% Si, K2	92.00

LOW PHOSPHORUS IRON, Gross Ton

Birdsboro, Pa. B10 (Phos. 0.075% max)	$73.00
Lyles, Tenn. T3 (Phos. 0.035% max)	73.00
Rockwood, Tenn. T3 (Phos. 0.035% max)	73.00
Buffalo H1 (Intermediate) (0.036-0.075% max)	71.50
Chicago I-3 (Phos. 0.075% max)	71.00
Cleveland A7 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Duluth I-3 (Phos. 0.075% max)	71.00
Erie, Pa. I-3 (Phos. 0.075% max)	71.00
Neville Island, Pa. P6 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Swedeland, Pa. A3 (Intermediate) (Phos. 0.036-0.075% max)	71.00
Troy, N.Y. R2 (Phos. 0.075% max)	73.00

Steel Service Center Products

Representative prices, cents per pound, f.o.b. warehouse, for 2000 lb orders. Prices will vary with total weight of the order. City delivery charges are 15 cents per 100 lb except: Denver, 20 cents; Baltimore, Boston, New York, Philadelphia, San Francisco, 10 cents; Atlanta, Birmingham, Dallas, Houston, Los Angeles, Seattle, no charge.

	SHEETS			STRIP	BARS			STRUCTURAL	PLATES	
	Hot Rolled	Cold Rolled	Galv.	Hot Rolled	H.R. Rounds	C.F. Rounds	H.R. Alloy 4140	SHAPES	Carbon	Floor
Atlanta	9.37	10.61	11.85	10.85	9.53	13.24	....	9.94	9.73	11.16
Baltimore	9.50	10.26	10.06	11.25	9.65	11.70	16.38	9.85	9.60	11.10
Birmingham	8.46	10.20	10.59	9.45	8.26	13.14	16.65	8.47	8.41	10.05
Boston	9.90	10.40	11.52	12.40	10.05	13.35	16.59	10.50	9.83	11.85
Buffalo	9.30	10.05	11.80	11.70	9.45	11.45	16.30	9.90	9.40	11.80
Charlotte, N. C.	9.95	11.22	10.55	11.35	10.00	12.68	....	10.20	9.95	11.75
Chicago	9.22	10.20	10.13	11.39	9.22	10.65	15.95	9.57	9.06	11.35
Cincinnati	9.38	10.26	10.18	11.71	9.33	11.53	16.27	10.14	9.44	11.68
Cleveland	9.22	10.66	10.92	11.51	9.33	11.25	16.06	9.96	9.30	11.59
Dallas	9.07	9.88	11.75	10.63	8.48	12.98	16.95	8.71	8.31	9.68
Detroit	9.48	10.46	10.50	11.76	9.53	11.01	16.23	10.14	9.43	11.61
Denver	9.41	11.77	12.11	9.86	10.10	11.47	....	10.02	9.69	11.83
Houston	8.67	9.48	11.35	10.23	8.08	13.10	16.55	8.31	8.00	9.28
Indianapolis	9.66	10.64	10.57	11.83	9.66	11.09	16.39	10.01	8.20	11.79
Kansas City	9.21	10.87	11.35	10.87	9.31	11.57	15.72	9.80	9.10	....
Los Angeles	10.35	11.20	12.10	12.40	10.25	14.20	17.35	10.45	10.30	12.30
Memphis, Tenn.	9.63	10.35	10.80	11.29	9.48	12.70	16.53	9.67	9.32	11.18
Milwaukee	9.36	10.34	10.27	11.53	9.36	10.89	16.09	9.79	9.20	11.49
Moline, Ill.	9.57	10.55	10.48	11.74	9.57	11.00	16.30	9.92	9.41	11.70
Newark, N. J.	9.81	10.34	11.54	12.37	10.05	13.25	16.40	10.35	9.79	11.82
New York	10.07	10.78	11.35	12.37	10.44	13.25	16.40	10.90	10.22	11.82
Philadelphia	9.50	10.00	10.66	11.25	9.65	11.95	16.38	9.85	9.60	11.10
Pittsburgh	9.22	10.53	11.68	11.49	9.22	11.25	15.95	9.57	9.06	11.35
Portland, Oreg.	10.40	12.25	12.35	12.40	10.40	16.65	17.85	11.00	10.55	12.70
St. Louis	9.42	10.58	10.51	11.59	9.44	11.28	16.33	9.80	9.28	11.59
St. Paul	8.82	9.49	10.64	10.99	8.82	11.49	16.54	9.17	8.66	10.95
San Francisco	10.65	11.65	11.75	12.70	10.55	15.10	17.25	11.10	10.80	12.95
Seattle	11.35	12.45	13.40	12.80	10.80	16.20	17.85	11.50	10.95	13.60
Spokane, Wash.	11.20	12.30	13.25	12.65	10.65	16.20	17.85	11.35	10.80	13.45

Specifications: Hot rolled sheet, sheared edge, 10 Ga. & 36 x 96-120 in.; cold rolled sheets, 20 Ga. & 36 x 96-120 in.; galvanized sheets, 10 Ga. x 36 x 120 in. except Los Angeles, Dallas and Houston, 10 Ga. x 48 x 120 in.; hot rolled strip, ⅛ in. x 1 in.; hot rolled carbon bars, rounds, ¾ in.—1¼ in., M1020; cold finished bars, 1 in., C1018; hot rolled alloy bars, 4140 annealed, 1⅝ in.—2⅝ in. rounds; structural shapes, I beams, 6 x 12½ in.; carbon plate, sheared, through ½ in. x 84 in.; floor plates, ¼ in. x 36 in.

Refractories

Fire Clay Brick (per 1000 pieces*)

High-Heat Duty: Ashland, Grahn, Hitchins, Olive Hill, Ky., Athens, Troup, Tex., Clearfield, Curwensville, Lumber, Orviston, West Decatur, Winburne, Snow Shoe, Pa., Bessemer, Ala., Farber, Mexico, St. Louis, Vandalia, Mo., Ironton, Oak Hill, Parrall, Portsmouth, Ohio, Ottawa, Ill., Stevens Pottery, Ga., Canon City, Colo., Frostburg, Md., $133; Templeton, Pa., $135; Salina, Pa., $138; Niles, Ohio, $139; Lehi, Utah, $175.

Super-Duty: Ironton, Ohio, St. Louis, Mexico, Vandalia, Mo., Olive Hill, Ky., Clearfield, Salina, Winburne, Snow Shoe, Pa., New Savage, Frostburg, Md., $200; Stevens Pottery, Ga., $210; Troup, Tex., $215; Lehi, Utah, $263.

Silica Brick (per 1000 pieces*)

Standard: Alexandria, Claysburg, Mt. Union, Sproul, Hawstone, Thompsontown, Pa., Ensley, Ala., Portsmouth, Ohio, St. Louis, $158; Warren, Niles, Windham, Ohio, $163; E. Chicago, Ind., Joliet, Ill., $168; Canon City, Colo., $173; Lehi, Utah, $183; Los Angeles, $185.

Semisilica Brick (per 1000 pieces*)

Woodbridge, N. J., Canon City, Colo., $133; Philadelphia, Clearfield, Pa., $138; Warren, Ohio, $148.

Ladle Brick (per 1000 pieces*)

Dry-Pressed: Alsey, Ill., Johnstown, Pa., Vandalia, Mo., $97; Chester, New Cumberland, W. Va., Freeport, Vanport, Merrill Station, Clearfield, Pa., Wellsville, Irondale, New Salisbury, Ohio, $100; Portsmouth, Ohio, $102; St. Louis, Mexico, Mo., $120; Lehi, Utah, $175.

High-Alumina Brick (per 1000 pieces*)

50 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $259; Danville, Ill., $253; Fords, N. J., Philadelphia, $265; Clearfield, Pa., $230; Orviston, Snow Shoe, Pa., Frostburg, Md., $260; Troup, Tex., $265.

60 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $310; Danville, Ill., $313; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $320; Troup, Tex., Fords, N. J., Philadelphia, $325.

70 *Per Cent:* St. Louis, Mexico, Vandalia, Mo., $350; Danville, Ill., $353; Clearfield, Orviston, Snow Shoe, Pa., Frostburg, Md., $360; Troup Tex., Fords, N. J., Philadelphia, $365.

Tar Bonded Brick (per ton)

Dolomite: Nario, Ohio, $87.50. Dolomite-Magnesite: Hays, Pa., Hammond, Ind., $107; Nario, Ohio, $109.50. Magnesite: Nario, Ohio, $128; Hays, Pa., Hammond, Ind., $130.

Sleeves (per 1000)

St. Louis, $193; Reesdale, Johnstown, Bridgeburg, St. Charles, Pa., $188; Ottawa, Ill., $205.

Nozzles (per 1000)

Johnstown, Bridgeburg, St. Charles, Pa., St. Louis, $310; Reesdale, Pa., $355.

Runners (per 1000)

Johnstown, Bridgeburg, St. Charles, Clearfield, Pa., $234; Reesdale, Pa., $245.

Dolomite (per ton)

Domestic, dead-burned bulk, Billmeyer, Blue Bell, Williams, Plymouth Meeting, York, Pa., Millville, W. Va., Bettsville, Millersville, Martin, Woodville, Gibsonburg, Nario, Ohio, $16.75; Thornton, McCook, Ill., $17; Dolly Siding, Mo., $15.60.

Magnesite (per net ton)

Domestic, dead-burned, ½ in. grains with fines, Chewelah, Wash., $46; minus ⅝ in. grains bulk, Luning, Nev., $46; ⅝ in. grains with fines (periclase), Baltimore, $73, Pascagoula, Miss., $90.

*—9 in. x 4½ x 2.50 straights.

Electrodes

Threaded with nipple; unboxed, f.o.b. plant

GRAPHITE

——Inches—— Diam	Length	Per 100 lb
2	24	$64.00
2½	30	41.50
3	40	39.25
4	40	37.00
5½	40	36.50
6	60	33.25
7	60	29.75
8, 9, 10	60	29.50
12	72	28.25
14	60	28.25
16	72	27.25
17	60	27.25
18	72	27.00
20	72	26.50
24	84	27.25

CARBON

8	60	14.25
10	60	13.80
12	60	14.75
14	60	14.75
14	72	12.55
17	60	12.65
17	72	12.10
20	90	11.55
24	72, 84	11.95
24	96	12.10
30	84	12.00
35, 40	110	11.60
40	100	12.50

Canadian Steel

(Cents per lb, f.o.b. mill, except as otherwise noted)

Billets, Blooms & Slabs:
Carbon (N.T.):

Forging	$97.00
Rerolling	78.00
Alloy (N.T.)	115.00

Wire Rods:

Carbon	5.70
Alloy	6.40

Wire (carload lots):

Merchant annealed	8.40
Low carbon indus.	7.20
Upholstery spring	8.55
M.B. spring	8.85

Bars & Small Shapes:

Carbon, merchant	5.30
Carbon, special	5.85
Alloy	6.40

Fluorspar

Metallurgical grades, f.o.b. shipping point in Ill., Ky., net tons, carloads, effective CaF_2 content 72.5%, $37-$41; 70%, $36-$40; 60%, $33-$36.50. Imported, net ton, f.o.b. cars point of entry, duty paid, metallurgical grade; European, $30-$33, contract; Mexican, all rail, duty paid, $29-$29.50; barge, Brownsville, Tex., $30-$31.

Metal Powder

(Per pound f.o.b. shipping point in ton lots for minus 100 mesh, except as noted.)

	Cents
Sponge Iron, domestic and foreign, 98% Fe, min. trucklots, freight allowed east of Mississippi River:	
100 mesh, bags	11.50
100 mesh, pails	9.85‡
40 mesh bags	7.50††
Electrolytic Iron, Melting stock, 99.9% Fe, irreg. fragments, ⅛ in. x 1.3 in.	27.75
(In contract lots of 750 tons price is 22.75c.)	
Annealed, 99.5% Fe, ton deld. east of Mississippi.	36.75,
Unannealed (99+% Fe)	33.0
Unannealed (99+% Fe) (minus 325 mesh)	58.0
Carbonyl Iron: 90-99.9%, 3 to 20 microns, depending on grade. 88.00-700.00 in standard 200-lb containers; all minus 200 mesh.	
Aluminum: Atomized, 600-lb drum freight allowed, c.l. 42.80; ton lots	41.80
Brass, 80/20, leaded (60 mesh)	37.80
Bronze powder, 90/10.	56.80
Copper, all types	15.00*
Lead	7.50*
Manganese, 500 lb and up	25.00*
Nickel, all types	0.78-1.06
Nickel-Silver	56.00
Solder	7.00*
Stainless Steel, 304	89.00
Stainless Steel, 316	$1.07
Steel, AISI 4600	32.00
Tin	14.00*
Zinc	23.20
Cobalt:	Dollars
98.5%, minus 100-300 mesh	1.57-1.58
99.5% below 5 microns	2.32
Molybdenum	4.35

*Plus cost of metal. ‡Depending on mesh. §Cutting and scarfing grades. **Depending on price of ore. ††Welding grade.

Imported Steel

(Base per 100 lb, landed, duty paid; based on current ocean rates with any rise for buyer's acc't. Source of shipment: Western Europe, except as noted.)

	North Atlantic	Great Lakes	South Atlantic	Gulf Coast	West Coast
Deformed Bars, Intermediate, ASTM-A 305	$5.55	$5.60	$5.50	$5.40	$5.70
Bar Size Angles	5.85	5.90	5.80	5.70	6.00
Structural Angles	5.75	5.80	5.70	5.60	5.90
I-Beams	5.75	5.90	5.80	5.70	6.00
Channels	5.75	5.90	5.80	5.70	6.00
Plates (basic bessemer)	5.65	5.70	5.60	5.50	5.80
Sheets, hot rolled and galvanized	Nom.	....	Nom.	Nom.	Nom.
Furring Channels, C.R., 1000 ft, ¾ x 0.30 lb per ft	23.66	23.72	23.59	23.31	25.04
Barbed Wire (†)	6.25	6.30	6.20	6.10	6.40
Merchant Bars	6.05	6.10	6.00	5.90	6.20
Hot-Rolled Bands	6.05	6.10	6.00	5.90	6.20
Wire Rods, Thomas No. 5 (Niederrhein)	5.80*	....	5.75	5.75	6.00
Wire Rods, O.H., No. 5 (Niederrhein)	6.00*	....	5.95	5.95	6.20
Wire Rods, O.H. (Sumitomo, Japan)	5.95	....	5.90	5.90	6.05
Bright Common Wire Nails (§)	7.30	7.35	7.25	7.15	7.45

†Per 82 lb net reel. §Per 100-lb keg, 20d nails and heavier. *Except Boston.

Ores

Lake Superior Iron Ore

(Prices effective for the 1961 shipping season, subject to later revision, gross ton, 51.50% iron natural, rail of vessel, lower lake ports.)

Mesabi nonbessemer	$11.45
Mesabi bessemer	11.60
Old Range nonbessemer	11.70
Old Range bessemer	11.85
Open-hearth lump	12.70
High phos.	11.45

Based on upper lake rail freight rates, lake vessel freight rates, handling and unloading charges, and taxes thereon, which were in effect Jan. 1, 1961; increases or decreases after that date are absorbed by the seller.

Eastern Local Iron Ore

New Jersey, concentrates ..... nom.

Foreign Iron Ore

Cents per unit

Swedish basic, 65%, c.i.f. Atlantic ports	25.00†
Chilean, 62-65%, c.i.f. Atlantic ports	22.00
Brazilian (lump), 68.5%, f.o.b. vessel, Victoria, per ton	$11.50

Tungsten Ore

Net ton, unit

Foreign wolframite, good commercial quality	$15.75-16.25*
Domestic, concentrates, f.o.b. milling points	22.00-23.00

Manganese Ore

Mn 46-48%, Indian, 85-90c, nom. per long ton unit, c.i.f. U. S. ports, duty for buyer's account.

Chrome Ore

Gross ton, f.o.b. cars New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., Tacoma, Wash.

Indian and Rhodesian	
48% 3:1	$34.00-35.00†
48% no ratio	25.00-26.00†
South African Transvaal	
44% no ratio	18.75
48% no ratio	24.00-26.00†
Turkish	
48% 3:1	35.00-37.00†
Domestic Rail nearest seller	
18% 3:1	30.00

Molybdenum

Sulfide concentrate, per lb of Mo content, mines, unpacked $1.40

Antimony Ore

Per short ton unit of Sb content, c.i.f. seaboard

55-60%	$3.00-3.50
60-65%	3.60-4.00

Vanadium Ore

Cents per lb V_2O_5

Domestic	31.00

*Before duty. †Nominal.

Metallurgical Coke

Price per net ton

Beehive Ovens

Connellsville, Pa. furnace	$14.75-15.25
Connellsville, Pa. foundry	18.00-18.50

Oven Foundry

Birmingham, ovens	$30.35
Cincinnati, deld.	33.34
Buffalo, ovens	32.00
Chattanooga, Tenn., ovens	30.80
Detroit, ovens	32.00
Pontiac, Mich., deld.	34.05
Saginaw, Mich., deld.	35.63
Erie, Pa., ovens	32.00
Indianapolis, ovens	31.25
Ironton, Ohio, ovens	30.50
Cincinnati, deld.	33.64
Kearny, N. J., ovens	31.25
Milwaukee, ovens	32.00
Neville Island (Pittsburgh), Pa., ovens	30.75
New Haven, Conn., ovens	31.00
Painesville, Ohio, ovens	32.00
Cleveland, deld.	34.45
Philadelphia, ovens	31.00
St. Louis, ovens	33.00
St. Paul, ovens	31.25
Chicago, deld.	34.78
Swedeland, Pa., ovens	31.00
Terre Haute, Ind., ovens	31.25

Coal Chemicals

(Representative prices)

Cents per gal f.o.b. tank cars or tank trucks, plant.	
Pure benzene	34.00
Xylene, industrial grade	29.00
Creosote	24.00
Naphthalene, 78 deg.	6.00
Toluene, one deg. (deld. east of Rockies)	25.00
Cents per lb, f.o.b. tank cars or tank trucks, deld.	
Phenol, 90 per cent grade	14.75
Per ton bulk, f.o.b. cars or trucks, plant.	
Ammonium sulfate, regular grade	$32.00

Ferroalloys

MANGANESE ALLOYS

Spiegeleisen: Carlot, 10 lb pigs, per gross ton, Palmerton, Pa., 21-23% Mn, $102.50; 19-21% Mn, 1-3% Si, $100; 16-19% Mn, $98. For Neville Island, Pa., prices add $2.50. Lump 35 lb and down: Deduct $2 from 10 lb pig prices at Palmerton.

Standard Ferromanganese: (Mn 74-76%, C 7% approx) base price per net ton, $220, Johnstown, Duquesne, Sheridan, Neville Island, Pa.; Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. Add or subtract $2 for each 1% or fraction thereof of contained manganese over 76% or under 74%, respectively (Mn 79-81%). Lump $228 per net ton, f.o.b. Anaconda, Mont. Add $2.60 for each 1% above 81%; subtract $2.60 for each 1% below 79%, fractions in proportion to nearest 0.1%.

High-Grade Low-Carbon Ferromanganese: (Mn 85-95%). Carload, lump, bulk, max 0.07% C, 35.1c per lb of contained Mn, carload packed 36.4c, ton lots 37.9c, less ton 39.1c. Delivered. Deduct 4c for max 0.15% C grade from above prices, 5.3% for max 0.03% C, 6.6c for max 0.5% C, and 8.1c for max 75% C—max 7% Si. **Special Grade:** (Mn 90% min, C 0.07% max, P 0.06% max), Add 2.05c to the above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.25-1.5%, Si 1.5% max). Carload, lump, bulk, 24c per lb of contained Mn; packed, carload 25.3c, ton lot 26.9c, less ton 28.1c.

Electrolytic Manganese Metal: Min carload, bulk, 34.25c; 2000 lb to min carload, 37c; less ton, 39c; 50 lb cans, add 0.5c per lb. Premium for hydrogen-removed metal 0.75c per lb. Prices are f.o.b. cars, Knoxville, Tenn., freight allowed to St. Louis or any point east of Mississippi River; or f.o.b. Marietta, O., freight allowed.

Silicomanganese: (Mn 65-68%). Carload, lump, bulk, 1.50% C grade, 18.5-21% Si, 11.6c per lb of alloy. Packed, c.l. 12.8c, ton 13.25c, less ton 14.25c, f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Portland, Oreg. For 2% C grade, Si 16-18.5%, deduct 0.2c from above prices. For 3% grade, Si 12.5-16%, deduct 0.5c from above prices. Spot, add 0.25c.

TITANIUM ALLOYS

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max, Si 5% max, C 0.10% max). Contract, ton lot, 2" x D, $1.50 per lb of contained Ti; less ton to 300 lb, $1. (Ti 38-43%, Al 8% max, Si 4% max, C 0.10% max). Ton lot $1.35, less ton to 300 lb $1.27, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract min c.l. $250 per ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi River and north of Baltimore and St. Louis. Spot, $255.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4%). Contract, c.l. $300 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed. Spot, $305.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: C.l. lump, bulk, 24.00c per lb of contained Cr. Delivered.

Charge Chrome: Cr 58-65%, C 5.25% max, Si 3% max, S 0.03% max, 22.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Blocking Chrome: Cr 55-63%, C 4-6%, Si 8-12%, S 0.03% max, 23.00c per lb of contained Cr, delivered in carlots, lump, bulk.

Refined Chrome: Cr 58-65%, C 4.25% max, Si 1.0% max, S 0.03% max, 24.00c per lb of contained Cr, carlots, lump, bulk, delivered.

Low-Carbon Ferrochrome: (Simplex) Cr 68-71%: C 0.025% max, 33.00c; C 0.010% max, 33.50c per lb of contained Cr, carlots, lump, bulk, delivered.

Cr 68-73%; C 0.25% max. 33.50c. Cr 67-73% C 0.05% max, 33.00c; C 0.75% max, 33.00c; C 2.0% max, 32.5c, carlots, lump, bulk, delivered.

Foundry Ferrochrome, High-Carbon: (Cr 62-66%, C 5-7%, Si 7-10%). C.l., 2" x D, bulk 30.8c per lb of contained Cr. Packed, c.l. 32.4c, ton 34.2c, less ton 35.7c. Delivered. Spot, add 0.25c.

Ferrosilicon Chrome: (Cr 50-54%, Si 28-32%, C 1.25 max). 8M x D, carload, bulk, 36.50c.

Ferrochrome-Silicon: Cr 39-41%, Si 42-45%, C 0.05% max, 11.50c per lb material; Cr 44-47%, Si 37-39%, C 0.15% max, 12.60c per lb material.

Chromium Metal, Electrolytic: Commercial grade (C 99.8% min, metallic basis Fe 0.2% max). Contract, carlot packed, 2" x D plate (above ⅛" thick) $1.15 per lb, ton lot $1.17, less ton lot $1.19. Delivered. Spot, add 5c.

VANADIUM ALLOYS

Ferrovanadium: Open hearth grade (V 50-55%, Si 8% max, C 3% max). Contract, any quantity, $3.20 per lb of contained V. Delivered. Spot, add 10c. **Special Grade:** (V 50-55% or 70-75%, Si 2% max, C 0.5% max) $3.30. **High Speed Grade:** (V 50-55% or 70-75%, Si 1.50% max, C 0.20% max) $3.40.

Grainal: Vanadium Grainal No. 1, $1.05 per lb; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lot, packed, $1.38 per lb contained V_2O_5 freight allowed. Spot, add 5c.

SILICON ALLOYS

50% Ferrosilicon: Carload, lump, bulk, 13.5c per lb contained Si. Packed, c.l. 16.0c, ton lot 17.45c, less ton 19.1c f.o.b. Alloy, W. Va.; Ashtabula, Marietta, O.; Chattanooga, Rockwood, Tenn.; Houston, Tex.; Sheffield, Ala.; Keokuk, Iowa; Portland, Oreg. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max). Add 1.45c to 50% ferrosilicon prices.

65% Ferrosilicon: Carload, lump, bulk, 15.75c per lb contained silicon. Packed, c.l. 17.75c, ton lot 19.55c, less ton 20.9c. Delivered. Spot, add 0.35c.

75% Ferrosilicon: Carload, lump, bulk, 16.9c per lb of contained Si. Packed, c.l. 18.8c, ton lot 20.45c, less ton 21.7c. Delivered. Spot add 0.3c.

90% Ferrosilicon: Carload, lump, bulk, 20c per lb of contained Si. Packed, c.l. 21.65c, ton lot 23.05c, less ton 24.1c. Delivered. Spot, add 0.25c.

Silicon Metal: (98% min Si, 1.00% max Fe, 0.7% max Ca). C.l. lump, bulk, 21.5c per lb of Si. Packed, c.l. 23.15c, ton lot 24.45c, less ton 25.45c. Add 0.5c for max 0.03% Ca grade. Add 0.5c for 0.50% Fe grade analyzing 98.25% min Si.

Alsifer: (Approx 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.85c per lb of alloy; ton lots, packed, 10.85c.

ZIRCONIUM ALLOYS

12-15% Zirconium Alloy: (Zr 12-15%, Si 39-43%, C 0.20% max). Contract, c.l., lump, bulk, 9.25c per lb of alloy. Packed, c.l. 10.45c, ton lot 11.6c, less ton 12.45c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max). Carload, bulk, 26.25c per lb of alloy, carload, lump, packed 27.25c, ton lot 28.4c, less ton 29.65c. Freight allowed. Spot, add 0.25c.

CALCIUM ALLOYS

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Carload, lump, bulk 23c per lb of alloy, carload packed 24.25c, ton lot 26.15c, less ton 27.15c. Delivered, Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.5-3%). Carload, lump, bulk 24c per lb of alloy, carload packed 25.65c, ton lot 27.95c, less ton 29.45c. Delivered. Spot, add 0.25c.

TUNGSTEN ALLOYS

Ferrotungsten: (70-80%). $2.45 per lb (all quantities) of contained W. Delivered.

BORON ALLOYS

Ferroboron: 100 lb or more packed (B 17.50% min, Si 1.50% max, Al 0.50% max, C 0.50% max). Contract, 100 lb or more 1" x D, $1.20 per lb of alloy; less than 100 lb $1.30. Delivered. Spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 85c per lb; Grade B (14-18% B) $1.20; Grade C (19% min B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si). Carload, bulk, lump, or 3" x D, $5.25 per lb of contained B. Packed, carload, $5.40, ton to c.l. $5.50, less ton $5.60. Delivered.

Carbortam: (B 1 to 2%). Lump, carload $320 per ton, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

BRIQUETTED ALLOYS

Chromium Briquets: (Weighing approx 3½ lb each and containing 2 lb of Cr). Carload, bulk 19.60c per lb of briquet, in bags 20.70c; 3000 lb to c.l. pallets 20.80c; 2000 lb to c.l. in bags 21.90c; less than 2000 lb in bags 22.80c. Delivered. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx 3 lb and containing 2 lb of Mn). Carload, bulk 13.7c per lb of briquet; c.l. packed, bags 14.9c; 3000 lb to c.l., pallets 14.9c; 2000 lb to c.l., bags 16.1c; less ton 17c. Delivered. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx 3½ lb and containing 2 lb of Mn and approx ½ lb of Si). C.l. bulk 14c per lb briquet; c.l. packed, bags 15.2c; 3000 lb to c.l., pallets 15.2c; 2000 lb to c.l., bags 16.4c; less ton 17.3c. Delivered. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx 5 lb and containing 2 lb of Si and small sizes, weighing approx 2½ lb and containing 1 lb of Si). Carload bulk 8c per lb of briquet; packed, bags 9.2c; 3000 lb to c.l., pallets 9.6c; 2000 lb to c.l., bags 10.8c; less ton 11.7c. Delivered. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each). $1.60 per lb of Mo contained, f.o.b. Langeloth, Pa.

Titanium Briquets: Ti 98.27%, $1 per lb f.o.b. Niagara Falls, N. Y.

OTHER FERROALLOYS

Ferrocolumbium: (Cb 50-60%, Si 4% max, C 0.1% max). Ton lots 2" x D, $3.45 per lb of contained Cb; less ton lots $3.50 (nominal). Delivered.

Ferrotantalum Columbium: (Cb 44-47% approx, Ta 15% approx, and Cb plus Ta 60% min, C 0.30% max). Ton lots 2" x D, $3.05 per lb of contained Cb plus Ta, delivered; less ton lots, $3.10.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx). Carload, bulk 19.25c per lb of alloy, c.l. packed ½ in. x 12 M 20.00c, ton lot 21.15c, less ton 22.40c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l., packed 20c per lb of alloy, ton lot 21.15c; less ton lot 22.4c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

V-3 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed 18.45c per lb of alloy; ton lot 19.95c; less ton lot 21.20c, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis.

Siminal: (Approx 20% each Si, Mn, Al; bal Fe). Lump, carload, bulk, 19.25c. Packed c.l. 20.25c; 2000 lb to c.l. 21.25c; less than 2000 lb 21.75c per lb of alloy. Delivered.

Ferrophosphorus: (23-25% based on 24% P content with unitage of $5 for each 1% of P above or below the base). Carload, bulk, f.o.b. sellers' works, Mt. Pleasant, Sigio, Tenn., $120 per gross ton.

Ferromolybdenum: (65-70%). Per lb of contained Mo in 2000-lb container, f.o.b. Langeloth and Washington, Pa., $1.89 in all sizes except powdered which is $1.95.

Technical Molybdic-Oxide: Per lb of contained Mo. in cans $1.60; in bags, $1.59, f.o.b. Langeloth and Washington, Pa.

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Never been installed or used car-type General Electric gas-fired furnace for stress relief annealing of plain carbon and stainless-steel castings or weldments.

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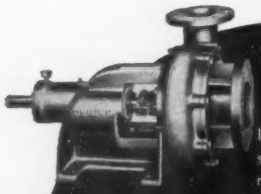

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Scrap Shows Signs of Weakening

Scrap Prices, Page 198

● **Chicago**—A few leading grades have dropped $1 a ton. Affected are No. 1 industrial and dealer heavy melting steel, No. 2 heavy melting, and No. 1 railroad heavy melting. The low volume of mill buying is a contributing factor, and the action of a leading consumer in cutting back on incoming shipments is another.

● **Philadelphia** — Less buying of scrap is reported, but domestic prices are unchanged, except for rail crops which are up $1 a ton to $52-$54, delivered.

● **New York** — Brokers' buying prices are steady, but there is little demand pressure from domestic consumers.

● **Pittsburgh**—The latest purchase of No. 1 heavy melting scrap by a mill on the fringe of the district was at a price equivalent to $38 a ton delivered Pittsburgh, unchanged from last month's. The local plant of GM's Fisher Body Div. is offering 3400 tons of No. 1 factory bundles for October shipment.

● **Cleveland** — In the absence of strong mill demand, the tone of the market is somewhat weaker, although prices are nominally unchanged. Two purchases of No. 1 heavy melting steel (one of industrial grade material) were reported at Youngstown last week at $42, off $1 a ton from the last previous purchase.

● **Buffalo**—Failure of the leading district consumer to place prime material orders for October delivery has dampened enthusiasm among dealers.

● **Cincinnati**—Prices on the steelmaking grades of scrap are unchanged, with No. 1 heavy melting quoted $35-$36. A district mill entered the market for October, making only selective purchases of No. 1 material.

● **St. Louis**—Some softening has developed in the scrap market, partly because of the situation in the automotive industry and the reduction in Japanese requirements. Mills are still buying in the same volume as they did recently, but dealers think pressure for concessions will push prices down $1 to $2 a ton.

● **Birmingham** — Prices are unchanged, but dealers are anticipating a $1 per ton rise on the foundry grades.

● **Houston**—Japanese demand for scrap will determine the course of the market over coming weeks. With an expected seasonal upturn in scrap intake, mill suppliers and exporters think prices will weaken unless export demand proves strong enough to bolster the market.

● **San Francisco**—The market is firm, though domestic buying is negligible. Also, a note of uncertainty prevails: The Japanese may shift more of their buying of steel scrap to the East Coast.

(*Please turn to Page* 203)

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(Par Value $5 Per Share)

Price $32.625 Per Share

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Iron and Steel Scrap

Consumer prices per gross ton, except as otherwise noted, including brokers' commission, as reported to STEEL, Oct. 4, 1961. *Changes shown in italics.*

STEELMAKING SCRAP COMPOSITE

Oct. 4	$39.50
Sept. 27	39.83
Sept. Avg.	39.75
Oct. 1960	30.04
Oct. 1956	57.27

Based on No. 1 heavy melting grade at Pittsburgh, Chicago, and eastern Pennsylvania.

PITTSBURGH

No. 1 heavy melting	37.00-38.00
No. 2 heavy melting	29.00-30.00
No. 1 dealer bundles	38.00-39.00
No. 2 bundles	27.00-28.00
No. 1 busheling	37.00 38.00
No. 1 factory bundles	47.00-48.00
Machine shop turnings	15.00-16.00
Mixed borings, turnings	15.00-16.00
Shovel turnings	20.00-21.00
Cast iron borings	19.00-20.00
Cut structurals:	
2 ft and under	43.00-44.00
3 ft and under	40.00-41.00
Heavy turnings	*31.00-32.00*
Punchings & plate scrap	45.00-46.00
Electric furnace bundles	44.00-45.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	34.00-35.00
Stove plate	34.00-35.00
Unstripped motor blocks	24.00-25.00
Clean auto cast	35.00-36.00
Drop broken machinery	47.00-48.00‡

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Random rails	46.00-47.00
Angles, splice bars	45.00-46.00
Railroad specialties	48.00-49.00
Rails, rerolling	59.00-60.00

Stainless Steel Scrap

18-8 bundles & solids	190.00-195.00
18-8 turnings	115.00-120.00
430 bundles & solids	90.00-95.00
410 turnings	*55.00-60.00*

CHICAGO

No. 1 hvy melt., indus.	*41.00-42.00*
No. 1 hvy melt., dealer	*39.00-40.00*
No. 2 hvy melting	36.00-37.00
No. 1 factory bundles	*44.00-45.00*
No. 1 dealer bundles	41.00-42.00
No. 2 bundles	25.00-26.00
No. 1 busheling, indus.	*41.00-42.00*
No. 1 busheling, dealer	*39.00-40.00*
Machine shop turnings	19.00-20.00
Mixed borings, turnings	21.00-22.00
Shovel turnings	21.00-22.00
Cast iron borings	21.00-22.00
Cut structurals, 3 ft	47.00-48.00
Punchings & plate scrap	49.00-50.00

Cast Iron Grades

No. 1 cupola	44.00-45.00
Stove plate	39.00-40.00
Unstripped motor blocks	35.00-36.00
Clean auto cast	49.00-50.00
Drop broken machinery	49.00-50.00

Railroad Scrap

No. 1 R.R. heavy melt.	*43.00-44.00*
R.R. malleable	49.00-50.00
Rails, 2 ft and under	52.00-53.00
Rails, 18 in. and under	53.00-54.00
Angles, splice bars	47.00-48.00
Axles	58.00-59.00
Rails, rerolling	61.00-62.00

Stainless Steel Scrap

18-8 bundles, solids	190.00-195.00
18-8 turnings	110.00-115.00
430 bundles & solids	95.00-100.00
430 turnings	55.00-60.00

BUFFALO

No. 1 heavy melting	32.00-33.00
No. 2 heavy melting	26.00-27.00
No. 1 bundles	32.00-33.00
No. 2 bundles	24.00-25.00
No. 1 busheling	32.00-33.00
Shovel turnings	17.00-18.00
Machine shop turnings	13.00-14.00
Cast iron borings	15.00-16.00
Low phos. structurals and plates, 2 ft and under	40.00-41.00

Cast Iron Grades (F.o.b. shipping point)

No. 1 cupola	37.00-38.00
No. 1 machinery	44.00-45.00

Railroad Scrap

Rails, random lengths	43.00-44.00
Rails, 3 ft and under	49.00-50.00
Railroad specialties	42.00-43.00
Rails, rerolling	64.00-65.00

CLEVELAND

No. 1 heavy melting	38.00-39.00
No. 2 heavy melting	24.00-25.00†
No. 1 factory bundles	42.00-43.00
No. 1 bundles	38.00-39.00
No. 2 bundles	23.00-24.00†
No. 1 busheling	38.00-39.00
Machine shop turnings	15.00-16.00
Shovel turnings	19.00-20.00
Mixed borings, turnings	19.00-20.00
Cast iron borings	19.00-20.00
Cut foundry steel	36.00-37.00
Cut structurals, plate 2 ft and under	43.00-44.00
Low phos. punchings & plate	39.00-40.00
Alloy free, short shovel turnings	20.00-21.00
Electric furnace bundles	40.00-41.00

Cast Iron Grades

No. 1 cupola	39.00-40.00
Charging box cast	26.00-27.00
Heavy breakable cast	28.00-29.00
Stove plate	36.00-37.00
Unstripped motor blocks	31.00-32.00
Brake shoes	37.00-38.00
Clean auto cast	44.00-45.00
Burnt cast	32.00-33.00
Drop broken machinery	48.00-49.00

Railroad Scrap

R.R. malleable	50.00-51.00
Rails, 2 ft and under	50.00-51.00
Rails, random lengths	47.00 48.00
Rails, 18 in. and under	52.00-53.00
Cast steel	43.00-44.00
No. 1 railroad cast	49.00-50.00
Railroad specialties	46.00-47.00
Angles, splice bars	46.00-47.00
Rails, rerolling	57.00-58.00

Stainless Steel Scrap (Brokers' buying prices; f.o.b. shipping point)

18-8 bundles, solids	165.00-170.00
18-8 turnings	95.00-100.00
430 clips, bundles, solids	80.00-85.00
430 turnings	15.00-25.00†

YOUNGSTOWN

No. 1 heavy melting	42.00-43.00
No. 2 heavy melting	25.00-26.00†
No. 1 busheling	42.00-43.00
No. 1 bundles	42.00-43.00
No. 2 bundles	25.00-26.00†
Machine shop turnings	17.00-18.00
Shovel turnings	22.00-23.00
Cast iron borings	22.00-23.00
Low phos.	43.00-44.00
Electric furnace bundles	43.00-44.00

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-44.00

CINCINNATI

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	35.00-36.00
No. 2 heavy melting	29.00-30.00
No. 1 bundles	36.00-37.00
No. 2 bundles	21.00-22.00
No. 1 busheling	35.00-36.00
Machine shop turnings	9.00-10.00
Mixed borings, turnings	12.00-13.00
Shovel turnings	14.00-15.00
Cast iron borings	14.00-15.00
Low phos., 18 in.	40.00-41.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Heavy breakable cast	30.00-31.00
Charging box cast	34.00-35.00
Drop broken machinery	46.00-47.00

Railroad Scrap

No. 1 R.R. heavy melt.	40.00-41.00
Rails, 18 in. and under	48.00-49.00
Rails, random length	42.00-43.00

DETROIT (Brokers' buying prices)

No. 1 heavy melting	33.00-34.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	*34.00-35.00*
No. 2 bundles	23.00-24.00
No. 1 busheling	32.00-33.00
Machine shop turnings	10.00-11.00
Mixed borings, turnings	11.00-12.00
Shovel turnings	12.00-13.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Mixed cast	31.00-32.00
Stove plate	28.00-29.00
Heavy breakable	27.00-28.00
Unstripped motor blocks	22.00-23.00
Clean auto cast	39.00-40.00

Stainless Steel Scrap

18-8 bundles & solids	170.00-175.00
18-8 turnings	70.00-75.00
430 bundles & solids	70.00-75.00

PHILADELPHIA

No. 1 heavy melting	40.00-41.00
No. 2 heavy melting	36.00-37.00
No. 1 bundles	43.00-44.00
No. 2 bundles	26.00-27.00
No. 1 busheling	44.00
Electric furnace bundles	45.00
Mixed borings, turnings	17.00†
Shovel turnings	20.00
Machine shop turnings	14.00
Heavy turnings	25.00†
Structurals & plates	45.00-46.00
Couplers, springs, wheels	44.00-46.00
Rail crops, 2 ft & under	*52.00-54.00*

Cast Iron Grades

No. 1 cupola	40.00
Heavy breakable cast	42.00
Drop broken machinery	49.00-50.00†
Malleable	49.00†

NEW YORK (Brokers' buying prices)

No. 1 heavy melting	30.00-31.00
No. 2 heavy melting	23.00-24.00
No. 1 bundles	30.00-31.00
No. 2 bundles	20.00-21.00
Machine shop turnings	4.50-5.00†
Mixed borings, turnings	5.00-5.50†
Shovel turnings	6.00-7.00†
Low phos. structurals & plates	34.00-35.00

Cast Iron Grades

No. 1 cupola	34.00-35.00
Unstripped motor blocks	25.00-26.00
Heavy breakable	32.00-33.00

Stainless Steel

18-8 sheets, clips, solids	160.00-165.00
18-8 borings, turnings	70.00-75.00
410 sheets, clips, solids	40.00-45.00
430 sheets, clips, solids	55.00-60.00

BOSTON

(Brokers' buying prices; f.o.b. shipping point)

No. 1 heavy melting	28.50-29.00
No. 2 heavy melting	25.00-26.00
No. 1 bundles	28.00-29.00
No. 1 busheling	28.50-29.00
Machine shop trunings	5.00-6.00
Shovel turnings	9.00-9.50
No. 1 cast	39.00-40.00
Mixed cupola cast	32.00-33.00
No. 1 machinery cast	40.00-42.00

ST. LOUIS (Brokers' buying prices)

No. 1 heavy melting	*35.00*
No. 2 heavy melting	*30.00*
No. 1 bundles	*35.00*
No. 2 bundles	25.00
No. 1 busheling	*35.00*
Machine shop turnings	16.50
Shovel turnings	18.50

Cast Iron Grades

No. 1 cupola	37.00
Charging box cast	34.00
Heavy breakable cast	32.00
Unstripped motor blocks	34.00
Clean auto cast	38.00
Stove plate	32.50

Railroad Scrap

No. 1 R.R. heavy melt.	39.00
Rails, random lengths	43.00
Rails, rerolling	55.00
Rails, 18 in. and under	46.00
Railroad specialties	44.00
Angles, splice bars	40.00†

BIRMINGHAM

No. 1 heavy melting	39.00-40.00
No. 2 heavy melting	30.00-31.00
No. 1 bundles	39.00-40.00
No. 2 bundles	22.00-23.00
No. 1 busheling	40.00-41.00
Cast iron borings	10.00-11.00
Machine shop turnings	18.00-19.00
Shovel turnings	20.00-21.00
Bar crops and plate	44.00-45.00
Structurals & plate	44.00-45.00
Electric furnace bundles	40.00-41.00
Electric furnace:	
3 ft and under	38.00-39.00
2 ft and under	39.00-40.00

Cast Iron Grades

No. 1 cupola	42.00-43.00
Stove plate	42.00-43.00
Unstripped motor blocks	31.00-32.00
No. 1 wheels	34.00-35.00

Railroad Scrap

No. 1 R. R. heavy melt.	39.00-40.00
Rails, rerolling	51.00-52.00
Rails, 2 ft and under	46.00-47.00
Rails, random lengths	42.00-43.00
Angles, splice bars	43.00-44.00

HOUSTON

(Brokers' buying prices; f.o.b. car)

No. 1 heavy melting	36.00-37.00
No. 2 heavy melting	33.00-34.00
No. 1 bundles	38.00-39.00
No. 2 bundles	24.00-25.00
Machine shop turnings	12.50-13.00
Crushed turnings	19.00
Low phos. plate & structurals:	
3 ft	41.00-42.00
2 ft and under	47.00-48.00

Cast Iron Grades

No. 1 cupola	41.50-42.50
Heavy breakable	25.00-26.00
Foundry malleable	29.00-30.00
Unstripped motor blocks	30.00-31.00

Railroad Scrap

R.R. heavy melt. (3 ft)	40.00-41.00

LOS ANGELES

No. 1 heavy melting	43.00-45.00
No. 2 heavy melting	*40.00*
No. 1 bundles	42.00
No. 2 bundles	*29.00-30.00*
No. 2 bundles (export)	*30.00-31.00*
Machine shop turnings	20.00
Shovel turnings	20.00
Cast iron borings	17.00-18.00
Electric furnace scrap	50.00-52.00

Cast Iron Grades

No. 1 cupola	*46.00-47.00*

Railroad Scrap

No. 1 R.R. heavy melt.	43.00-45.00

PORTLAND, OREG.

(Prepared, f.o.b. car)

No. 1 heavy melting	49.00
No. 2 heavy melting	45.00
No. 2 bundles	35.00
Shovel turnings	18.00
Electric furnace	54.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable	38.00
Unstripped motor blocks	*38.00*
Stove plate (f.o.b. plant)	37.00

SEATTLE (Prepared, f.o.b. car)

No. 1 heavy melting	49.00
No. 1 hvy (unprepared)	44.00
No. 2 heavy melting	45.00
No. 2 hvy (unprepared)	40.00
No. 2 bundles	35.00
Shovel turnings	16.00-18.00
Electric furnace	52.00

Cast Iron Grades

No. 1 cupola	41.00
Heavy breakable cast	38.00
Stove plate (f.o.b. plant)	36.00
Unstripped motor blocks	37.00

SAN FRANCISCO

No. 1 heavy melting	43.00**
No. 2 heavy melting	40.00**
No. 1 bundles	34.00**
No. 2 bundles	29.00**
Machine shop turnings	16.00-18.00
Mixed borings, turnings	16.00 18.00
Cast iron borings	16.00-18.00
Heavy turnings	16.00-18.00
Shovel turnings	16.00-18.00

Cast Iron Grades

No. 1 cupola	47.00
Charging box cast	34.00
Stove plate	34.00
Heavy breakable cast	28.00
Unstripped motor blocks	31.00
Clean auto cast	40.00
Drop broken machinery	45.00-46.00
No. 1 wheels	34.00

HAMILTON, ONT.

(Brokers' buying prices; net tons)

No. 1 heavy melting	30.00
No. 2 hvy melt, 2 ft & under	29.00
No. 1 bundles	31.00
No. 2 bundles	23.50
Mixed steel scrap	22.00
Mixed borings, turnings	12.00
Busheling, new factory: Prepared	30.00
Unprepared	24.00
Shovel turnings	12.00

Cast Iron Grades‡

No. 1 machinery cast	32.00

**Based mainly on export sales.
†Nominal.
‡F.o.b. Hamilton, Ont.
§Delivered.

Our population is growing, moving, shifting. And more people than ever need more goods—opening new areas in which to build your business, to provide more jobs in America's growing economy.

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NOW'S THE TIME TO GET GROWING IN A GROWING AMERICA!

Scrap Export Storm Rages

Nonferrous Metal Prices, Pages 202 & 203

CURB the export of copper scrap!

That request was made at the annual meeting of the Non-Ferrous Founders' Society and relayed to the Department of Commerce in the form of a resolution. It was the latest flareup in the war that industries dependent on copper scrap have been waging for more than a year to limit exports.

● **The Problem** — Statistics paint a pretty clear picture of the problem: In 1956, 76,166 tons (metal weight) of copper and copper alloy scrap were exported from the U. S. In 1957, the figure was 118,984 tons; in 1958, 50,362 tons; in 1959, 40,127 tons. In 1960, exports spiraled to 183,936 tons. And exports are continuing unabated this year. Through the first seven months, the total was 117,863 tons. This year, scrap exports could set a record.

Users don't contend they can't get scrap. They admit it's available, at a price. But they claim they can't pay the price being offered overseas and compete in the U. S. market.

● **"Unfair" Competition**—The heart of the controversy is this: Japan, in an effort to build up its copper industry, has been the biggest buyer of U. S. scrap (100,000 tons in 1960). Japan levies a 10 per cent import tax on refined copper, but none on scrap, ores, and concentrates.

Custom smelters say their inability to compete for scrap and concentrates has lowered their production and cost them sales. Employment is down in the industry; one smelter on the West Coast has closed. Brass and bronze ingot makers and other users also claim injury.

● **No Action Pending**—So far the government has refused to put a clamp on exports.

No Tin Disposal

Congress adjourned without acting on the request from General Services Administration for authority to dispose of 50,000 long tons of tin in the national stockpile.

What happens now? Most observers believe the market will see a period of stability, with the U. S. price holding at $1.20 to $1.25 a pound for the remainder of the year, barring any severe international crisis. Buying is slack and probably will stay that way for some time. Disposal of the remaining 1800 tons of tin from the special GSA inventory continues to act as a brake.

Aluminum Prices Foggy

The aluminum industry hasn't recovered from the drop in prices.

It's certain that profits will suffer. The industry expects a substantial sales upswing over the remainder of the year and how much it will help to ease the pain of lower prices remains to be seen.

No across-the-board adjustments were made. Aluminum Co. of America makes this point: "Product price adjustments do not conform to any uniform pattern, but they were resolved individually in the light of varying cost and competitive factors."

It's believed that many of the present quotations on mill products better reflect the selling price. But observers think we'll see less price shading in the months ahead.

● **Blasts Pricing**—One of the most candid blasts at industry pricing policies came a few days ago from Robert P. Koenig, president of Cerro Corp., who charged that price schemes in the sheet fabricating industry have made it an economic Alice in Wonderland. Mr. Koenig's point is that while ingot prices are as low as they were five years ago, sheet prices are even lower.

Mr. Koenig charges that certain companies have been selling coiled sheet to container manufacturers at only 2 cents a pound more than the price of ingot, a price level at which a profit is impossible. Coiled siding sheet has been handled similarly, says Mr. Koenig.

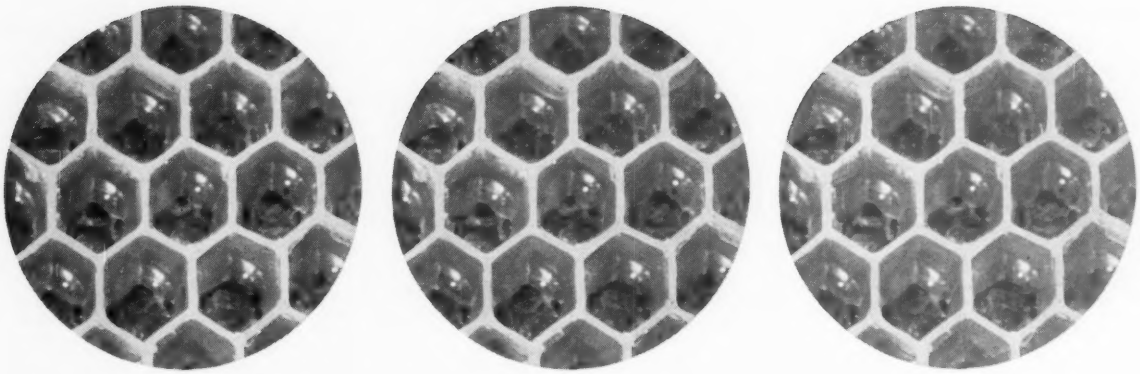
His proposal: "A return to a sound and just pricing schedule for semifabricated products."

● **Waiting for an Opening** — The call for higher prices will find a lot of sympathetic ears in the aluminum industry. While some of the producers may not agree with Mr. Koenig's views on commodity pricing, all would like nothing better than a justification to hike current quotations, particularly on mill products. If business continues to improve, such a move could come in the next few months.

NONFERROUS PRICE RECORD

	Oct. 4 Price	Last Change	Previous Price	Sept. Avg	Aug. Avg	Oct., 1960 Avg
Aluminum	24.00	Sept. 25, 1961	26.00	25.520	26.000	26.000
Copper	31.00	May 19, 1961	30.50	31.000	31.000	30.760
Lead	10.80	Dec. 13, 1960	11.80	10.800	10.800	11.800
Magnesium	35.25	Aug. 13, 1956	33.75	35.250	35.250	35.250
Nickel	81.25	June 30, 1961	74 00	81.250	81.250	74.000
Tin	121.125	Oct. 4, 1961	121.50	121.960	119.685	103.445
Zinc	11.50	Jan. 9, 1961	12.00	11.500	11.500	13.000

Quotations in cents per pound based on: COPPER, mean of primary and secondary, deld. Conn. Valley; LEAD, common grade, deld. St. Louis; ZINC, prime western, East St. Louis; TIN, Straits, deld. New York; NICKEL, electrolytic cathodes, 99.9%, base size at refinery, unpacked; ALUMINUM, primary ingot, 99.5+%, f.o.b. customer custody; MAGNESIUM, pig, 99.8%, Velasco, Tex.



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Nonferrous Metals

Cents per pound, carlots except as otherwise noted.

PRIMARY METALS AND ALLOYS

Aluminum: 99.5%, 30 and 50 lb ingots, 24.00, 30,000 lb or more, f.o.b. customer custody.

Aluminum Alloy: No. 13, 25.20; No. 43, 25.30; No. 195, 26.70; No. 214, 28.10; No. 356, 26.00, 30 and 50 lb ingots.

Antimony: R.M.M. brand, 95.5%, 32.50; Lone Star brand, 33.00, f.o.b. Laredo, Tex., in bulk. Foreign brands, 99.5%, 30.50-31.00, New York, duty paid, 10,000 lb or more.

Beryllium: 97% lump or beads, $70.00 per lb, f.o.b. Cleveland or Reading, Pa.

Beryllium Aluminum: 5% Be, $65 per lb of contained Be, with balance as Al at market price, f.o.b. shipping point.

Beryllium Copper: 3.75-4.75% Be, $43 per lb of contained Be, with balance as Cu at market price on shipment date, f.o.b. shipping point.

Bismuth: $2.25 per lb, ton lots.

Cadmium: Sticks and bars, $1.70 per lb deld.

Cobalt: 99+%, $1.50 per lb for 500-lb keg; $1.52 per lb for 100 lb case; $1.57 per lb under 100 lb.

Columbium: Powder, $40 per lb and up nom.

Copper: Electrolytic, 31.00 deld; custom smelters, 31.00 nom; lake, 31.00 deld; fire refined, 30.75.

Germanium: Purified, Ingots, less than 1 kg 37.50 per gram; 1-10 kg 32.00 per gram; 10 kg or more, 29.95 per gram; intrinsic grade, under 10 kg, 31.95 per gram; 10 kg or more, 29.95 per gram.

Gold: U. S. Treasury, $35 per oz.

Indium: 99.9%, $2.25 per troy oz.

Iridium: $70-75 per troy oz nom.

Lead: Common, 10.80; chemical, 10.90; corroding, 10.90; St. Louis, New York basis, add 0.20.

Lithium: 1 lb or 2 lb ingots, less than 24 lb, $11 per lb deld; 24-99 lb, $9.50; 100-449 lb, $9.25; 450 lb or more, $9 per lb, delivered.

Magnesium: Pig, 35.25; ingot, 36.00 f.o.b. Velasco, Tex., 1.3 in. diam. x 12 in. sticks, 57.00 f.o.b. Madison, Ill.

Magnesium Alloy: AZ91A (diecasting), 40.75; AZ63A, AZ92A, AZ91C (sand casting), 40.75 f.o.b. Velasco, Tex.

Mercury: Open market, spot, New York, $188-191 per 76 lb flask.

Molybdenum: Unalloyed forging billets, 4.125-8.5 in. diam., 50-4999 lb, $8.15 per lb, depending on quantity; 5000 lb or more, $8 per lb, f.o.b. Coldwater, Mich.

Nickel: Electrolytic cathodes, briquettes, sheets (4 x 4 in. and larger), unpacked, 81.25; 10-lb pig, unpacked, 89.00; "XX" nickel shot, 88.75; "F" nickel shot for addition to cast iron, in kegs, 81.75; "F" nickel, 5 lb ingots, 82.75. Prices f.o.b. Port Colborne, Ont., including import duty. New York basis, add 1.09; Exton, Pa., basis, add 1.60. Nickel oxide sinter at Buffalo, New York, or other established U. S. ports of entry, contained nickel 77.50.

Osmium: $70-90 per troy oz nom.

Palladium: $24-26 per troy oz.

Platinum: $82-85 per troy oz from refineries.

Radium: $16-21.50 per mg radium content, depending on quantity.

Rhodium: $137-140 per troy oz.

Ruthenium: $55-60 per troy oz.

Selenium: $6.50-7 per lb, commercial grade.

Silver: Open market, 91.375 per troy oz.

Sodium: Solid pack, c.l., 19.50; l.c.l., 20.00; 5 and 12 lb bricks, c.l., 21.00; l.c.l., 21.50; tank car, 17.00.

Tantalum: Melting stock, $35 per lb; rod, $60 per lb nom; sheet, $55 per lb nom.

Tellurium: $5.25 per lb, 100 lb or more.

Thallium: $7.50 per lb.

Tin: Straits, N. Y., spot and prompt, 121.125.

Titanium: Sponge, 99.3+% grade A-1, ductile (0.3% Fe max), $1.37 per lb; grade A-2 (0.5% Fe max), $1.50 per lb.

Tungsten: Powder, 98.8%, carbon reduced, 100-lb lots, $2.75 per lb nom., f.o.b. shipping point; less than 1000 lb, add 15.00c; 99+% hydrogen reduced, $3.25.

Zinc: Prime Western, 11.50; brass special 11.70; intermediate, 11.70, East St. Louis, freight allowed over 0.50 per lb. New York basis, add 0.50. High grade, 12.35; special high grade, 12.50 deld. Diecasting alloy ingot No. 3, 13.75; No. 2, 14.25; No. 5, 14.00 deld.

Zirconium: Reactor grade sponge, 100 lb or less, $7.25-7.75 per lb; 100-500 lb, $6.75-7.25 per lb; 500-1000 lb, $6.25-6.75; over 1000 lb, $6.25 per lb.

(Note: Chromium, manganese, and silicon metals are listed in ferroalloy section.)

SECONDARY METALS AND ALLOYS

Aluminum Ingot: Piston alloys, 24.00; No. 12 foundry alloy (No. 2 grade), 21.25; 5% silicon alloy, 0.60 Cu max, 23.00; 13 alloy, 0.60 Cu max, 23.00; 195 alloy, 24.25; 108 alloy, 21.75. Steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 22.75; grade 2, 21.50; grade 3, 20.50; grade 4, 19.50.

Brass Ingot: Red brass, No. 115, 32.00; tin bronze, No. 225, 41.25; No. 245, 35.75; high leaded tin bronze, No. 305, 36.00; No. 1 yellow, No. 405, 27.50; manganese bronze, No. 421, 31.25.

Magnesium Alloy Ingot: AZ63A, 37.50; AZ91B, 37.25; AZ91C, 41.25; AZ92A, 37.50.

NONFERROUS PRODUCTS

BERYLLIUM COPPER

(Base prices per lb, plus mill extras, 2000 to 5000 lb; nom. 1.9% Be alloy.) Strip, $1.955, f.o.b. Temple, Pa., or Reading, Pa., rod, bar, wire, $1.955, f.o.b. Temple, Pa.

COPPER WIRE

Bare, soft, f.o.b. eastern mills, 20,000-lb lots, 36.35; l.c.l., 36.98. Weatherproof 20,000-lb lots, 37.05; l.c.l., 37.80.

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh.) Sheets, full rolls, 140 sq ft or more, $16.50 per cwt; pipe, full coils, $16.50 per cwt; traps and bends, list prices plus 30%.

TITANIUM

(Prices per lb, 10,000 lb and omer, f.o.b. mill.) Sheets and strip, $5.70-15.50; sheared mill plate, $4.45-9.00; wire, $5.00-9.50; forging billets, $3.00-4.75; hot-rolled and forged bars, $3.39-6.25.

ZINC

(Prices per lb, c.l., f.o.b. mill.) Sheets, 28.00; ribbon zinc in coils, 22.50; plates, 21.50.

ZIRCONIUM

Plate, $11.00-16.00; H.R. strip, $11.00-15.00; C.R. strip, $13.00-18.00; forged or H.R. bars, $11.00-15.00.

NICKEL, MONEL, INCONEL

	"A" Nickel	Monel	Inconel
Sheets, C.R.	147	126	145
Strip, C.R.	133	114	145
Plate, H.R.	134	116	133
Rod, Shapes, H.R. .	116	95	116
Seamless Tubes	157	129	200

ALUMINUM

(Selected products and sizes)

Flat Sheets: 1100, 3003, and 5005, mill finish, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
0.250-0.183	24-72	72-180	44.40-47.00
0.183-0.154	24-72	72-180	44.40-47.00
0.154-0.120	24-72	72-180	44.90-47.80
0.120-0.096	24-72	72-180	44.90-47.80
0.096-0.076	24-72	72-180	45.40-49.30
0.076-0.060	24-72	72-180	45.90-50.10
0.060-0.047	24-72	72-180	46.40-51.30
0.047-0.037	24-72	72-180	46.90-52.70
0.037-0.030	24-72	72-180	47.40-54.30
0.030-0.023	24-60	72-180	47.90-56.10
0.023-0.018	24-48	72-144	48.40-56.40
0.018-0.014	24-48	72-144	50.20-57.00
0.014-0.011	24-48	72-144	52.50-59.00
0.011-0.0085	24-36	72-96	55.20
0.0085-0.007	24-36	72-96	58.20
0.007-0.006	24-36	72-96	61.00

ALUMINUM (continued)

Plates: 1100, 3003, and 5005, mill finish, 0, H12, and H14 tempers, 30,000 lb base f.o.b. customer custody.

Thickness Range (in.)	Width (in.)	Length Range (in.)	Price Range
3.000-2.000	6-144	72-240	45.10-50.00
2.000-1.251	6-144	72-240	45.50-50.30
1.251-0.751	6-144	72-240	44.50-49.60
0.751-0.250	6-144	72-240	44.50-49.80

Screw Machine Stock: 30,000 base, 12 ft lengths.

Diam (in.)*	Round 2011-T3	Round 2017-T4	Hexagonal 2011-T3	Hexagonal 2017-T4
0.125	74.90	76.30	....	....
0.188	63.20	62.20	....	79.10
0.250	60.00	61.60	72.70	73.10
0.375	59.20	62.80	71.00	71.00
	2011-T3	2017-T451	2011-T2	2017-T451
0.500	59.20	62.80	71.00	71.00
0.625	59.20	62.80	67.80	66.90
0.750	57.70	61.00	61.60	62.80
0.875	57.70	61.00	61.60	62.80
1.000	57.70	61.00	61.60	62.80
1.125	55.30	58.50	59.50	60.50
1.375	55.30	58.50	59.50	60.50
1.500	55.30	58.50	59.50	60.50
1.625	53.00	55.70	....	58.30
1.750	53.00	55.70	58.30	58.30
1.875	53.00	55.70	....	58.30
2.000	53.00	55.70	58.30	58.30
2.250	51.50	54.00	....	58.30
2.500	51.50	54.00	....	58.30
2.750	49.90	52.20	....	58.30
3.000	49.00	52.20	....	58.30
3.250	....	52.20	....	....
3.375	....	52.20	....	....

*Selected sizes.

Forging Stock: Rounds, Class 1, random length, diam., 0.375-8 in., "F" temper; 2014, 45.50-55.60; 6061, 41.50-55.60; 7075, 56.50-64.60; 7079, 58.50-66.60.

Pipe: ASA schedule 40, alloy 6063-T6, 3-40 ft lengths, plain ends, 90,000 lb base, dollars per ft. Nominal pipe sizes: 1 in., 32.00; 1¼ in., 43.40; 1½ in., 51.80; 2 in., 62.60; 3 in., 124.95; 4 in., 171.80; 5 in., 233.15; 6 in., 308.55; 8 in., 464.35; 10 in., 716.25 (3-24 ft lengths).

Extruded Solid Shapes

Factor	Alloy 6063-T5	Alloy 6062-T6
1-14	45.30-46.80	54.00-60.00
15-17	45.30-46.80	56.50-61.80
18-23	45.80-47.50	58.60-67.00
24-32	45.80-47.50	66.80-81.50
33-38	49.50-52.20	85.10-96.60
39-44	59.80-63.60	102.00-124.00

MAGNESIUM

Sheets and Plates: AZ31B standard grades, .032 in., 103.10; .081 in., 77.90; .125 in., 70.40; .188 in., 69.00; .250-2.00 in., 67.90. AZ31B spec. grades, .032 in., 171.30; .081 in., 108.80; .125 in., 98.10; .188 in., 95.70; .250-2.00 in., 93.30. Tread plate, 60-192 in. lengths, 24.72 in. width; .125 in., 74.90; .188 in., 71.70-72.70; .25-.75 in., 70.60-71.60. Tooling plate, 0.25-3.00 in., 73.00.

Extruded Solid Shapes:

Factor	(AZ31C) Com. Grade	(AZ31B) Spec. Grades
6-8	65.30-67.60	84.60-87.40
12-14	65.30-67.60	85.70-88.00
24-26	66.10-68.40	90.60-91.30
36-38	71.50-75.30	104.20-105.30

NONFERROUS SCRAP

DEALER'S BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 23.50-24.00; No. 2 heavy copper and wire, 21.50-22.00; light copper, 18.75-19.25; No. 1 composition red brass, 21.50-22.00; No. 1

BRASS MILL PRICES

(Copper or Copper Alloy No.)	MILL PRODUCTS a Sheet, Strip, Plate	Rod	Wire	Seamless Tubes	SCRAP ALLOWANCES d (Based on copper at 31.00c) Clean Heavy	Rod Ends	Clean Turnings
Copper (110)	56.13b	50.36-51.36	....	57.32	27.00	27.00	26.25
Yellow Brass (268, 270).	49.27	35.77c	49.56	53.43	20.375	19.50c	18.50c
Low Brass, 80% (240)..	52.15	52.09	52.44	56.21	22.875	22.625	22.125
Red Brass, 85% (230) ..	53.17	53.11	53.46	57.23	23.875	23.625	23.125
Com. Bronze, 90% (220)	54.73	54.67	55.02	58.54	24.75	24.50	24.00
Manganese Bronze (675)	57.69	51.27	61.54	....	19.25	19.00	18.50
Muntz Metal (365)	51.94	47.25	....	....	19.125	18.875	18.375
Naval Brass (464)	53.94	47.75	60.25	58.10	19.00	18.75	18.25
Silicon Bronze (651)	61.39	60.58	60.68	79.80	26.50	26.25	25.75
Nickel Silver, 10% (745)	65.56	67.16	66.91	....	26.00	25.75	13.00
Phos. Bronze, A-5% (510)	76.97	77.47	76.72	78.90	28.50	28.25	27.25

a. Cents per lb, f.o.b. mill; freight allowed on 50 lb or more. b. Hot-rolled. c. Free cutting. d. Prices in cents per lb for less than 20,000 lb, f.o.b. shipping point. On lots over 20,000 lb at one time of any or all kinds of scrap, add 1 cent per lb.

composition turnings, 20.50-21.00; new brass clippings, 17.50-18.00; light brass, 14.50-15.00; heavy yellow brass, 15.50-16.00; new brass rod ends, 16.50-17.00; auto radiators, unsweated, 18.00-18.50; cocks and faucets, 18.00-18.50; brass pipe, 17.50-18.00.

Lead: Soft scrap lead, 7.25-7.50; battery plates, 3.00-3.25; linotype and stereotype, 8.50-8.75; electrotype, 8.00-8.25; mixed babbitt, 10.00-10.50.

Monel: Clippings, 26.00-26.50; old sheets, 25.00-25.50; turnings, 18.50-19.00; rods, 25.00-25.50.

Nickel: Sheets and clips, 56.00-58.00; rolled anodes, 56.00-58.00; turnings, 43.00; rod ends, 56.00-58.00.

Zinc: Old zinc, 3.00-3.25; new diecast scrap, 3.00-3.50; old diecast scrap, 1.75-2.00.

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 4.00-4.50; segregated high copper clips, 9.75-10.25; mixed low copper clips, 10.25-10.75; mixed high copper clips, 9.75-10.25.

(Cents per pound, Chicago)

Aluminum: Old castings and sheets, 8.50-9.00; clean borings and turnings, 6.00-6.50; segregated low copper clips, 13.00-13.50; segregated high copper clips, 12.00-12.50; mixed low copper clips, 11.50-12.00; mixed high copper clips, 11.00-11.50.

(Cents per pound, Cleveland)

Aluminum: Old castings and sheets, 9.75; clean borings and turnings, 8.50; segregated low copper clips, 13.00; segregated high copper clips, 12.25; mixed low copper clips, 12.25; mixed high copper clips, 12.50.

REFINERS' BUYING PRICES

(Cents per pound, carlots, delivered refinery)
Beryllium Copper: Heavy scrap, 0.020-in. and heavier, not less than 1.5% Be, 57.00; light scrap, 52.00; turnings and borings, 37.00.

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 25.00; light copper, 22.75; refinery brass (60% copper) dry copper content, 23.75.

INGOTMAKERS' BUYING PRICES

Copper and Brass: No. 1 heavy copper and wire, 27.00; No. 2 heavy copper and wire, 25.00; light copper, 22.75; No. 1 composition borings, 24.00; No. 1 composition solids, 24.50; heavy yellow brass solids, 18.00; yellow brass turnings, 16.50; radiators, 20.00.

Plating Material

(F.o.b. shipping point, freight allowed on quantities)

ANODES

Cadmium: Special or patented shapes, $1.60.

Copper: Flat-rolled, 47.50; oval, 44.50; electrodeposited, 37.50; cast, 42.50; 5000-10,000 lb quantities.

Nickel: Depolarized, less than 500 lb, 117.50; 500-1999 lb, 110.50; 2000-4999 lb, 107.00; 5000-29,999 lb, 106.00; 30,000 lb, 105.00. Carbonized, deduct 3 cents a lb.

Tin: Bar or slab, less than 200 lb, 140.50; 200-499 lb, 139.00; 500-999 lb, 138.50; 1000 lb or more, 138.00.

Zinc: Balls, 18.25; flat tops, 18.25; flats, 21.00; ovals, 20.85, ton lots.

CHEMICALS

Cadmium Oxide: $1.60 per lb in 100-lb drums.
Chromic Acid (flake): 100-2000 lb, 31.00; 2000-10,000 lb, 30.50; 10,000-20,000 lb, 30.00; 20,000 lb or more, 29.50.

Copper Cyanide: 100-200 lb, 65.90; 300-900 lb, 63.00; 1000-19,000 lb, 61.90.

Copper Sulphate: 100-1900 lb, 15.50; 2000-5900 lb, 13.50; 6000-11,900 lb, 13.25; 12,000-22,900 lb, 13.00; 23,000 lb or more, 12.50.

Nickel-Chloride: 100 lb, 47.50; 200 lb, 45.50; 300 lb, 44.50; 400-4900 lb, 42.50; 500-9900 lb, 40.50; 10,000 lb or more, 39.50.

Nickel Sulphate: 5000-22,999 lb, 31.00; 23,000-39,900 lb, 30.50; 40,000 lb or more, 30.00.

Sodium Cyanide (Cyanobrik): 200 lb, 23.80; 400-900 lb, 20.80; 1000-4900 lb, 19.80; 5000-19,900 lb, 18.80; 20,000 lb or more, 17.60.

Sodium Stannate: Less than 100 lb, 89.20; 100-600 lb, 79.50; 700-1900 lb, 76.80; 2000-9990 lb, 74.90; 10,000 lb or more, 73.60.

Stannous Chloride (Anhydrous): 100 lb, 148.40; 400 lb, 138.40; 800-19,000 lb, 117.10; 20,000 lb or more, 112.90.

Stannous Sulphate: Less than 50 lb, 155.70; 50 lb, 125.70; 100-1900 lb, 123.70; 2000 lb or more, 121.70.

Zinc Cyanide: 100-200 lb, 59.00; 300-900 lb, 57.00.

(*Concluded from Page 197*)

• **Portland, Oreg.**—Exporters have been negotiating last quarter business with Japanese buyers, and they expect additional contracts to be placed shortly. Meanwhile, prices are unchanged with No. 1 heavy melting and No. 2 heavy melting in limited supply. The cast iron grades are less firm than the steel items.

• **Seattle**—The higher scrap prices announced recently are holding. Mill buying is more active, and exports continue to provide market support.

• **Los Angeles**—Weak demand is reflected in a slight drop in prices in certain grades of scrap. No. 2 heavy melting is quoted $40, No. 2 bundles $29-$30, No. 1 cupola $46-$47. Demand is sluggish, and dealers' yard stocks are ample.

Alabama Changes Specs to Favor Domestic Steel

Specifications for construction of highways and bridges in Alabama have been amended by the State Highway Department to require the use of domestic steel.

Reinforcing steel, wire mesh steel fabric, wire for all types of fence, steel bearing piles, steel sheet piling, and structural steel must be rolled, processed, fabricated, and manufactured in the U. S., its territories, or possessions. If procurement of domestic steel or wire is impractical, the restriction may be waived.

Distributors . . .

Prices, Page 193

Distributors report an increase in September business with a further gain expected this month. Some think October will be the peak month of the year.

Tonnagewise, many distributors in the Southwest are close to equaling the volume of banner 1956. As mill delivery periods lengthen, service center sales are rising. Roofing materials are expected to be used in volume to repair damage caused by Hurricane Carla.

In the Los Angeles area, sizable inquiries from the aircraft industry give indication of healthy bookings in the fourth quarter.

CLASSIFIED

Machinery and Equipment Wanted

WANTED: STRAIGHTENER

Five-roll Pipe and Tubing Straightener with 8⅝" OD or larger capacity. Please furnish complete specifications, including make, model and serial number.

O. F. MALY
VALLEY STEEL PRODUCTS CO.
Louisiana, Mo.
Phone: SKyline 4-4542

Help Wanted

FERROUS METALLURGIST

Company engaged in extractive and pyrometallurgy requires well qualified graduate metallurgist for production, development and quality control who has experience in one or more of the following: smelting and refining, steel making, or electric furnace operation. Excellent opportunities for qualified man. Hospitalization, insurance, profit sharing and pension plan provided cost free by company. Opening at Kentucky plant. All replies held strictly confidential. Submit detailed resume, including educational and employment backgrounds, as well as salary requirements to Box 967, STEEL, Penton Bldg., Cleveland 13, Ohio.

WANTED — ASSISTANT SUPERINTENDENT blast furnace operation. Young well established completely integrated steel company located in great southwest area needs to fill key position in its blast furnace department with well qualified man age limit 45 years. Company currently engaged in multi-million dollar expansion program. Excellent opportunity. Submit complete resume giving personal history, education, experience and salary requirements. All replies held confidential. Box 961, STEEL, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST—Graduate, age 28-40 for steel manufacturer. Prefer experience in stainless or alloy steel production. Plant located Middle Atlantic area. In resume furnish education, complete work history, salary expected. Equal opportunities employer. Write Box 966, STEEL, Penton Bldg., Cleveland 13, Ohio.

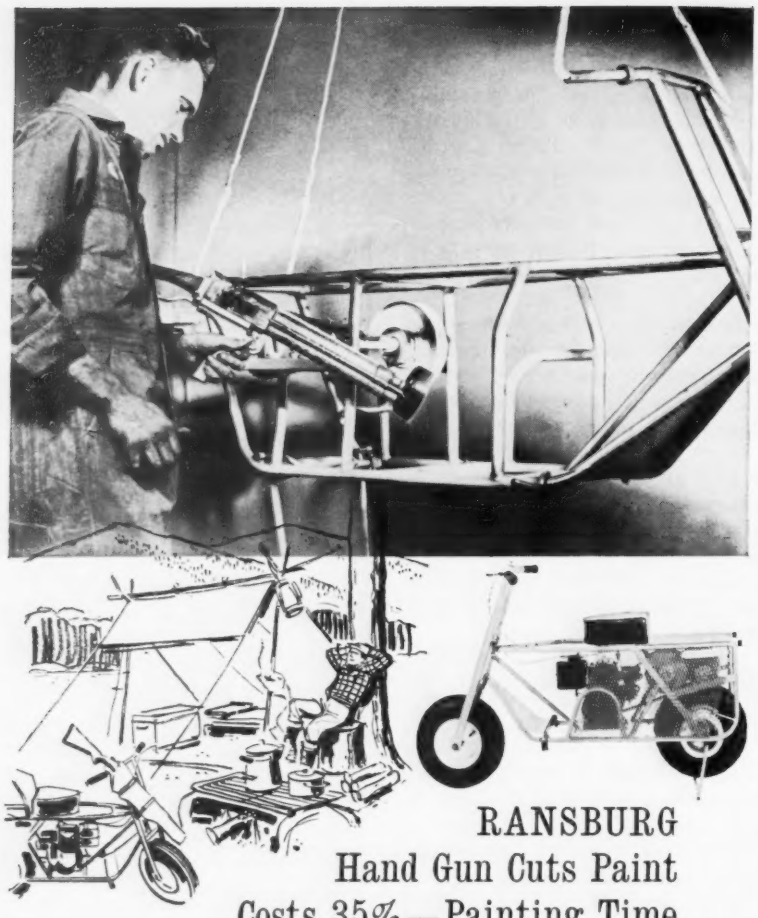
Want higher salary, greater opportunity, more security? "NER" describes hundreds of new, SPECIFIC, Executive job openings monthly, $7,000-$35,000 pay range. U.S.A.—Overseas. Write for free copy. Strict confidence. National Employment Reports, 105 W. Adams, 830-C3, Chicago 3.

Positions Wanted

Experienced Executive. Experienced in all phases of steel and plate fabrication including estimating, sales and general management. Available because of merger. Desires position as President or Vice President. Reply Box 965, STEEL, Penton Bldg., Cleveland 13, Ohio.

CLASSIFIED RATES

All classifications other than "Position Wanted" set solid, 50 words or less $20.00, each additional word, .40; all capitals, 50 words or less $23.00, each additional word .50; all capitals leaded, 50 words or less $28.00, each additional word .65. "Position Wanted" set solid, 25 words or less $5.50, each additional word .22; all capitals 25 words or less $7.50, each additional word .29; all capitals leaded 25 words or less $9.00, each additional word .35. Keyed address takes seven words. Cash with order necessary on "Position Wanted" advertisements. Replies forwarded without charge. Displayed classified rates on request. Address your copy and instructions to STEEL, Penton Building, Cleveland 13, Ohio.



RANSBURG Hand Gun Cuts Paint Costs 35%—Painting Time 25% Over Former Flo-Coat in the Production of TOTE GOTE Cycles

Continually searching for better and faster manufacturing methods, the Bonham Corporation, Provo, Utah, switched from flo-coating to Ransburg Electrostatic hand spray to paint their Tote Gotes. The Tote Gote is an "off-highway" cycle, especially popular with hunters and fishermen who use it to travel over rough and rugged terrain not readily accessible by highways and roads.

Now, with electrostatic spray painting, Bonham is getting an improved uniform coating . . . a 35% savings in paint cost . . . and painting time is cut 25%. And this over flo-coat!

The predominately tubular construction of the Tote Gote makes it particularly adaptable for painting with the Ransburg No. 2 Process Hand Gun. That's because the "wrap-around" feature of electrostatic painting covers all such areas from one side only.

NO REASON WHY YOU CAN'T DO IT TOO

See how the Ransburg Electrostatic Hand Gun can save time . . . paint . . . and cut costs in YOUR finishing department. Or, if your production justifies, it will pay you to investigate Ransburg's automatic electrostatic spray painting equipment. Send for our No. 2 Process brochure which cites numerous examples of modern production painting in both large and small plants.

RANSBURG

RANSBURG Electro-Coating Corp.

Box 23122, Indianapolis 23, Indiana

Affiliates in AUSTRALIA • AUSTRIA • BELGIUM • BRAZIL • DENMARK • ENGLAND • FRANCE • FINLAND GERMANY • HOLLAND • INDIA • IRELAND • ITALY • NEW ZEALAND • NORWAY • PAKISTAN • SOUTH AFRICA SPAIN • SWEDEN and SWITZERLAND

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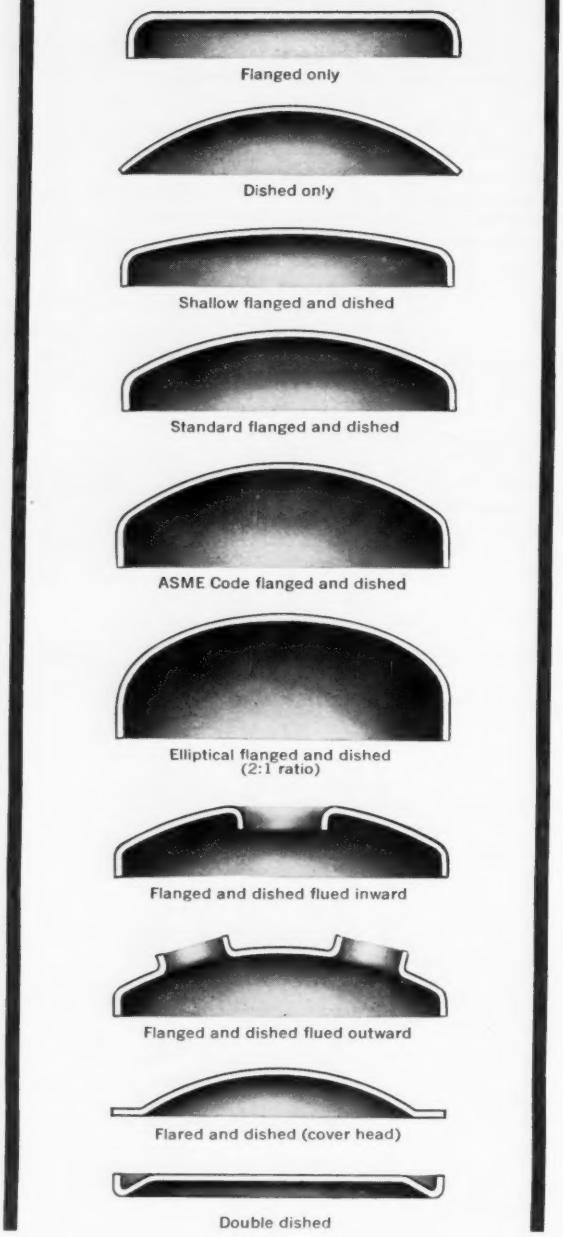

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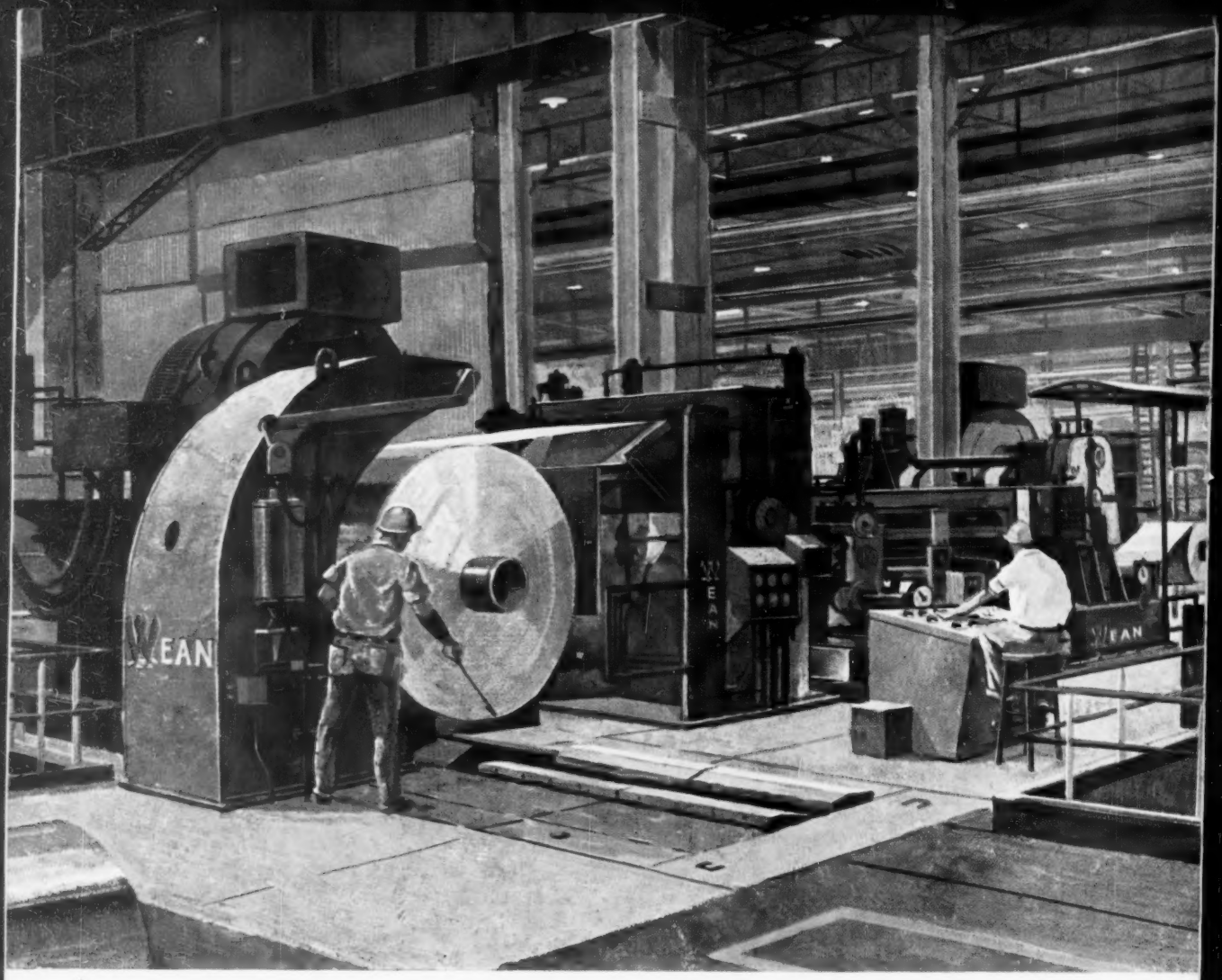

PORTRAIT OF PROGRESS: *Wean Coil Preparation Line at Weirton Steel Company, Division of National Steel Corporation*

Weirton Increases Efficiency of Tinning with Wean Coil Preparation Line

The trend toward purchase of tin plate in coil form has placed increased emphasis on the production of uniformly high quality coils. To assure this uniformity in the end product, Weirton Steel Company has installed this high-speed Wean side-trim and recoil line to prepare coils for the tinning operation. The line side trims tin plate stock and builds up larger, more evenly wound coils for more efficient operation of the tinning lines.

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